Volusia County, Florida

SUSTAINABILITY ACTION PLAN | 2012



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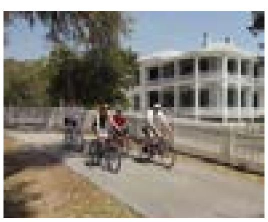
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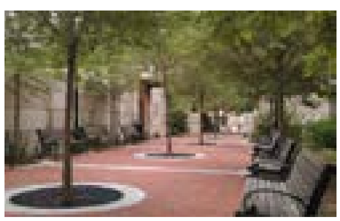
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Executive Summary











"Now, more than ever, it is important to balance environmental and economic considerations in our daily operations. A sustainable future for Volusia County, and our entire region, will be based on solutions that include environmental, economic and social considerations."

- Volusia County Council

Over the past few decades, communities have grown increasingly concerned about their environmental health and sustainability. Among other things, these concerns relate to the relationship between a healthy environment and a healthy economy; potential impacts of climate change, particularly for coastal communities; and water quality and availability. To help address these challenges, Volusia County has developed a Sustainability Action Plan (SAP).

Sustainability Action Plans are tools that local governments across the world, including many throughout Florida, are using to chart a course to reduce dependency on fossil fuels; assure clean, affordable water; restore natural lands; and implement an efficient transportation network. In preparing this SAP, Volusia County is contributing to local sustainability efforts across Florida and in other states by taking action in its own operations and providing guidance for the broader community. Efforts to improve sustainability provide cost savings to Volusia County residents through reductions in energy, water, and other resource costs.

The goals and objectives recommended in this plan will also make Volusia County a more attractive and healthier place to live - through an improved local job market, improved bike and pedestrian facilities, better air quality, cheaper energy and water bills, less waste, greener streets, and more local amenities.

The Volusia County SAP includes a set of sustainability goals for healthy, vital communities. These goals support the notion that sustainable communities are equally focused on balancing environmental, economic, and social qualities.

- Provide a Healthy **Economy**
- Maintain a Healthy **Environment**
- Promote a Healthy **Community**
- Encourage Efficient **Transportation** and **Community Design**
- Conserve Water and Promote **Water Efficiency**
- Conserve Energy and Promote **Renewable Energy**
- Reduce Waste and Promote **Recycling**

The SAP includes objectives and implementable actions for each goal to help translate the SAP guiding principles into on-the-ground results. The SAP depicts a detailed summary of the Goals and Objectives, and their associated sustainability benefits.







Energy Use and Greenhouse Gas Emissions

A major focus of the SAP is the assessment of energy consumed in two categories: Volusia County government operations and the community at large. It also includes an analysis of the related effects on greenhouse gas (GHG) emissions, measured as metric tons of carbon dioxide (MT CO_2e).

In 2007, Volusia County operations created and emitted 112,644 MT CO_2e. This is roughly the equivalent of the annual operation of 22,000 passenger vehicles, the CO_2 emissions from the electricity use of 14,000 homes for one year, or the carbon sequestered annually by approximately 24,000 acres of pine forests. The estimated community-wide energy use generated 6.4 million MT CO_2e, of which 93 percent was generated in the energy and transportation sectors. To put into context, the community-wide emissions per capita were about the same as those in Palm Beach County, lower than Monroe and Sarasota Counties, but higher than both Miami-Dade and Broward Counties.

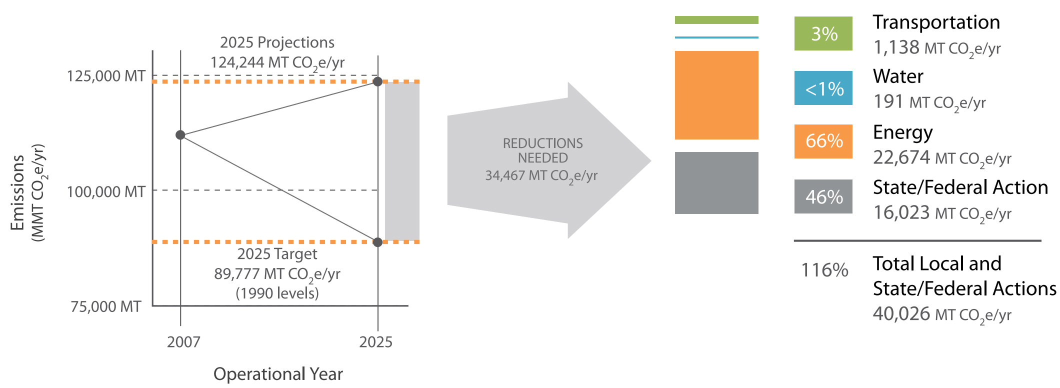
Emissions Reduction Targets

The SAP used this 2007 data to estimate "business as usual" (BAU) emissions for 2025. But instead of accepting this future, this plan presents an alternative: a blueprint of how to reduce emissions to 1990 levels (the equivalent of a 20.3 percent reduction). To help meet its 2025 goals, the SAP analyzed a variety of possible actions for the county. Part of this analysis included a calculation of the action's costs in relation to its anticipated benefits. The diagram on this page details the project emissions reduction needed to meet this goal.

In terms of county operations, the local actions detailed in the SAP will enable the county to achieve its reduction target of 20.3 percent by 2025. However, community-wide reductions are a more difficult challenge. Even in implementing the recommended actions, expected community-wide emission reductions will achieve about 62 percent of the reduction target. To address this gap, the county could develop additional objectives and implementing actions or increase participation rates beyond those estimated in this Plan. Over time, new methodologies will be developed to quantify additional SAP objectives and actions.

EMISSIONS PROJECTIONS

PROGRESS TOWARD TARGET



VOLUSIA COUNTY MILESTONES OF SUSTAINABILITY

2000
Volusia ECHO Grants and Volusia Forever Land acquisition programs begin

2003
Smart Growth Volusia County initiative for growth management commences

2008
Green Volusia begins a long-term initiative intended to promote the sustainable use of county resources and educate; Volusia County adopts Environmental Core Overlay

2009
Volusia County Government's first Green Building Project was built

2009
2.41 million-dollar block grant awarded to Volusia County for seven sustainability projects

2010
Volusia County becomes a certified Green Local Government; Green Building Incentive program started

Moving Forward

The SAP provides a pathway to achieve the county's sustainability goals, including GHG emissions reductions. Ensuring that objectives translate from policy language into on-the-ground results is critical to the success of the SAP. To facilitate this, each sustainability goal and objective describes actions that are the responsibility of the county to implement. To ensure success, the county will identify who is responsible for each action, set a timeframe for implementation, and define measures or indicators to track success.

The county will coordinate evaluation of each SAP objective and summarize progress toward SAP objectives and targets in a report that describes:

- Sustainability accomplished, and estimated annual GHG reductions to date
- Achievement of progress indicators
- Participation rates (where applicable) and
- Remaining barriers to implementation

For the SAP to remain relevant, the county must also adapt and transform the Plan over time. New information about climate change science and risk will emerge, new GHG reduction technologies and innovative municipal strategies will be developed, new financing will become available, and state and federal legislation will change. The county will assess the implications of new scientific findings and technology, explore new sustainability opportunities, respond to changes in state and federal policy, and incorporate these changes in future updates to the SAP.

KEY REDUCTION ACTIONS

County operation reductions:

- Retrofitting county buildings to become more energy efficient;
- Converting the fleet of county vehicles to those that
- use compressed natural gas, liquefied petroleum gas, and/or electric power; and,
- Reducing the amount of waste generated.

Community-wide reductions:

- Implementing policies that encourage land use design to reduce vehicle miles traveled in the county;
- Promoting energy efficiency in private residential and commercial buildings; and,
- Promoting the development and use of alternative fuels;
- Encouraging the use of energy efficient vehicles county-wide.

Acknowledgment: This material is based upon work supported by the Department of Energy through funding from the Energy Efficiency and Conservation Block Grant Program under Award Number DE EE0000799.

2011
Green House Gas (GHG) baseline; 2007 GHG emissions are established for community-wide and government operations

County begins sustainability retrofits on ten buildings
2011

2012
Sustainability Action Plan (SAP) completed

SAP Interim progress indicators, GHG emissions analyzed to identify progress towards 2025 target goal
2020

Volusia County's GHG emission goals reached
2025

2025
Florida Statewide emissions 40% reduction goal and return to 1990 levels

Introduction

About This Plan

Sustainability Action Plans are tools that local governments across the world, including many throughout Florida, are using to chart a course to reduce dependency on fossil fuels and nonrenewable energy and to combat global climate change. In preparing this Sustainability Action Plan (SAP), Volusia County is contributing to local sustainability efforts across Florida and in other states by taking action in its own operations and providing guidance for the broader community. Efforts to improve sustainability provide cost savings to Volusia County residents through reductions in energy, water, and other resource costs.

The goals and objectives recommended in this plan will also help make Volusia County a more attractive and healthier place to live - through an improved local job market, improved bike and pedestrian facilities, better air quality, cheaper energy and water bills, less waste, greener streets, and more local amenities. Reduced energy and water consumption, and reduced waste generation in the community resulting from implementation of this plan are important indicators of a sustainable future. Sustainability is measured in many ways, across all sectors of our community. This plan addresses many sustainability indicators, some of which are measurable (such as electricity saved) and some of which are qualitative in nature (such as quality of life). One of the measurable sustainability benefits that we will focus on is the greenhouse gas (GHG) emissions resulting from our individual and collective actions.

This SAP addresses both the GHG emissions generated from county government operations and the emissions generated community-wide. The SAP examines each of the major emission sectors in Volusia County and sets forth strategies to help the county move toward a lower-carbon future.

This plan was funded through a U.S. Department of Energy, Energy Efficiency Community Block Grant (EECBG) as part of the 2009 American Recovery and Reinvestment Act (ARRA). This plan is part of the overall strategy that Volusia County created to invest EECBG funds in projects that will result in substantial reductions in energy usage and costs while providing long-term sustainable benefits to the community as a whole.

This SAP consists of the following four chapters:

Chapter 1: Sustainability and Volusia County presents the scientific frame of reference for a discussion of climate change and its effects on the county, and describes statewide actions addressing climate change. GHG inventories and projections for county operations and community-wide activities are presented, along with the county's emissions reductions targets.

Chapter 2: Sustainability Goals and Principles describes the county's seven sustainability goals, which include objectives and implementation actions to translate the SAP's vision into on-the-ground results.

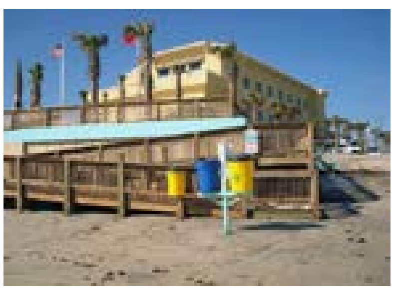
Chapter 3: GHG Reduction Targets and Implementation Framework demonstrates the quantifiable reductions attributed to the SAP's objectives and actions. Reductions associated with statewide actions are also included. Progress towards achieving the county's reduction targets based on the SAP's objectives and actions and statewide actions are also included.

Chapter 4: Tracking, Measurement, and Verification Plan includes a format for an annual progress report.

Guiding Principles











The SAP is based on five guiding principles. These principles underlie the goals, objectives, and action steps that follow and will be used to measure our success.

1. Sustainability guides Volusia County policy.

The concept of sustainability is that we should be able to meet the needs of today without compromising the ability of future generations to meet their own needs. In practice, this means that Volusia County government strives to ensure that all policy decisions have long-term positive impacts for our economy, community, and natural environment.

2. Our economy, our community, and our environment are interconnected and mutually dependent.

Each aspect of our society is important and critical to the success of the others. A sustainable future for Volusia County, and our entire region, will be based on solutions that include environmental, economic, and social considerations.

3. As a county government, we have both the opportunity and responsibility to use resources wisely, and to encourage others to do the same.

Volusia County's government is large, diverse, and uniquely positioned to influence the sustainability of our entire community. We have committed to providing excellent service to residents and businesses in Volusia County by expanding green practices within county operations, educating the public about environmentally responsible practices, and becoming a leader in sustainability.

4. Success depends upon partnerships in the local, regional, and national community.

Long-term sustainability cannot be achieved by any individual or organization. Only through cooperation between government, businesses, residents, and other community stakeholders can we achieve a sustainable community. The county will build relationships and encourage and foster civic engagement toward our common goals.

5. Education and community outreach are fundamental to success.

Achieving community sustainability depends on many individual decisions. Residents and businesses must understand the effects of their decisions upon the economic, environmental, and community health of Volusia County and our region, and make a personal commitment to sustainability. The county will be a leader in providing educational opportunities so that our citizens can become stewards of a sustainable future.

Chapter 1
Sustainability and Volusia County

Why is Volusia County Preparing a Sustainability Action Plan?

Volusia County has a long history of pro-active protection of environmental resources through such programs as the award-winning land acquisition and management programs; Environmental, Cultural, Heritage and Outdoor (ECHO) programs; smart growth planning initiatives, and exemplary standards for environmental protection. This SAP is a natural extension of the culture of recognizing the importance of balancing the social, environmental, and economic aspects of the county as we move toward the development of a sustainable community.

Public Participation in Sustainability Planning

The keystone to a successful plan is the participation of community stakeholders. Volusia County incorporated meaningful participation of both internal and external stakeholders through a series of workshops.

Sustainability Action Plan Workshops

The Volusia County Government's commitment to create a plan to reduce GHG emissions began with the selection of AECOM and Holland and Knight to assist in the development of a SAP. The consultants were selected to assist the county in conducting the community-wide GHG emissions inventory, and in the preparation of strategies, policies, and tools to increase energy and water efficiency and conservation to reduce GHG emissions county-wide.

An internal stakeholder kickoff meeting was held in January 2011, at which all areas of county government operations were represented. Staff that participated in this working group meeting were familiarized with the plan development process, the information to be gathered, and the implementation of the plan. Staff participation ensured that the plan would encompass all of the county's operational needs.





In May 2011, individuals from the public were invited to attend a half day workshop to assist in developing the objectives and actions for the plan. The community stakeholders represented many different organizations within Volusia County. Public participation at this workshop was vital in order to ensure the plan reflected the values and goals of Volusia County citizens. The objectives and actions established in this workshop were used to guide the county project team through prioritization, development, evaluation and implementation of the county's future sustainable initiatives.

In July 2012, the county held a second internal stakeholder meeting to review the SAP goals, objectives, and action steps, and to gather input for implementation priorities.

Climate Change Science

GHG emissions and resulting climate change impacts are considered a major global challenge for the 21st century. Possible impacts on Florida could include:

- Sea-level rise leading to increased flooding of low-lying areas; erosion of beaches; loss of coastal wetlands; intrusion of salt water into water supplies; and increased vulnerability of coastal areas to storms,
- Northern encroachment in Florida by exotic pests, such as melaleuca *(Melaleuca quinquenervia)* and iguana *(Iguana iguana)*, and
- More severe storms and droughts that could affect crop production, pests, and property.

According to the United Nations International Panel on Climate Change (IPCC), consensus among the world's leading scientists is that climate change is a reality, and that industrial era human activity is its primary cause. Due largely to the combustion of fossil fuels, atmospheric concentrations of carbon dioxide (CO_2) are at a level unequaled for at least the last 800,000 years. GHGs from burning fossil fuels for use in buildings and transportation, and methane produced by agricultural practices are trapping more of the sun's heat in the earth's atmosphere and warming the earth (see **Figure 1.1**). Over the last century, average global temperatures rose by more than 1°F, and some regions warmed by as much as 4°F. Continued temperature increases are predicted for coming years.

Projections indicate that atmospheric concentrations of GHGs will continue to increase throughout this century. If these projections become reality, climate change poses a very real threat to our economic well-being, public health, and environment.

In its 4th assessment of climate change, the IPCC provided a comprehensive overview of the impacts of climate change. This report describes potential global emission scenarios for the coming century. The scenarios vary from a best-case scenario characterized by low population growth, clean technologies, and low GHG emissions; to a worst-case scenario where high population and fossil-fuel dependence result in extreme levels of GHG emissions. While some degree of climate change is inevitable, most climate scientists agree that to avoid serious climate change effects, atmospheric GHG concentrations need to be stabilized as quickly as possible.

Implications for Local Governments

GHG emissions and climate change are global issues of great importance, with a seemingly long time horizon. It is often difficult to relate such large issues with actions of local governments or individuals. We ask ourselves, what can one person or one county do to improve on a global issue, especially when faced with difficult financial decisions that are often much more time critical?

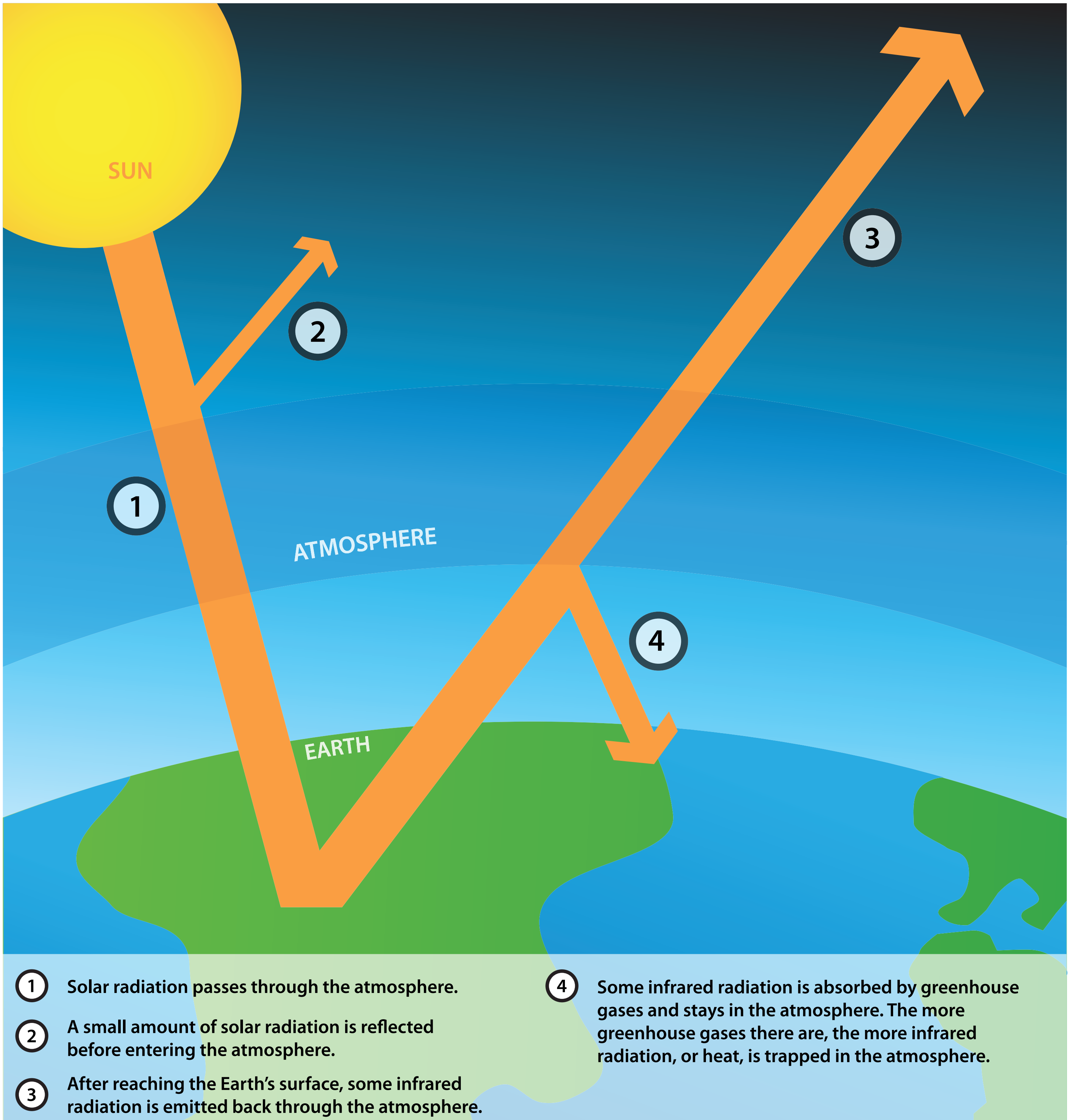
The reality is that local governments (and individuals) have a large impact on GHG emissions and climate change because we make decisions about resource consumption that cumulatively have a large impact. State and national governments have a role to play, but the thousands of decisions made in local governments around the world are critical.

Volusia County is especially vulnerable to climate change and sea-level rise due to its geography and geology. Fifty miles of coastal beach ecosystem stretch along Volusia's eastern boundary, housing several threatened and endangered species. In addition, the St. John's River extends along the southern and western borders of the county, providing a different type of ecosystem for other Florida species, as well as defining both the political boundary and the way of life for Volusia County citizens. Both of these water-dependent features define Volusia's unique geography and geology and are vulnerable to climate induced sea-level rise. The rate of sea-level rise is increasing dramatically with every decade, putting Volusia County's ecosystems and lifestyles at risk.

The entire state of Florida lies within the Atlantic Coastal Plain, which has a maximum elevation of less than 400 feet above sea level. Volusia County has an average elevation of 40 feet above sea level, making beach erosion and salt water intrusion inevitable. This, in turn, will cause drastic changes in the ecosystems throughout Volusia County. Also, given the geographic location in the center of a long peninsula, the county is poised to receive influxes of people, plants, and animals that may migrate from vulnerable southern counties. A plan for adaption for such migrations will be critical to ensuring that a solid physical and societal infrastructure is in place.



Figure 1.1 – Greenhouse Effect



Source: AECOM, 2012

State Legislation

In 2006, the Florida Legislature passed the Florida Energy Act, creating the Florida Energy Commission (FEC), renewable energy grants, and a solar rebate program. In 2007, Governor Charlie Crist signed two executive orders aimed at reducing GHG emissions and establishing an Action Team on Energy and Climate Change. Also in 2007, the Legislature directed the Florida Building Commission to create a model green building ordinance. In 2008, the Legislature directed local governments to include GHG reduction strategies into Local Government Comprehensive Plans and required local governments and state agencies to construct new government buildings to a recognized third-party green rating system, such as the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) or standards created by the Florida Green Building Coalition (FGBC). Also in 2008, the Legislature directed the FEC to make the Florida Building Code significantly more energy efficient compared to the 2007 code. In 2010, the Legislature enabled local governments to create energy financing and retrofitting programs and revised the state's recycling targets to become more aggressive.

In 2011, the Florida Legislature rescinded the requirement for local governments to include GHG reduction strategies within their comprehensive plans through adoption of its new growth management bill (HB 7207).

There is not a legal statewide mandate to reduce GHG emissions in Florida. However, the executive orders signed by Governor Crist in 2007 remain in effect and are intended to enable local governments to adopt SAPs. These executive orders are described briefly below.

Executive Order 07-126:

This Executive Order requires the state government to measure its own GHG emissions and develop a Governmental Carbon Scorecard. The state is then to work to reduce its emissions 10% by 2012, 25% by 2017, and 40% by 2025.

Pursuant to this Executive Order, the state prepared and adopted a statewide GHG inventory for the year 2005. To achieve the goals for 2012-2025, state buildings constructed in the future must be energy efficient and should include solar panels whenever possible. Future state office space leases must be in energy-efficient buildings as well. State vehicles should be fuel efficient and use ethanol and biodiesel fuels when available.

Executive Order 07-127:

This Executive Order also directs Florida to adopt motor vehicle emission standards similar to those in place in California, which require a 22% reduction in vehicle emissions by 2012, and a 30% reduction by 2016.

In addition, Florida will require energy-efficient consumer appliances to increase efficiency by 15%. Governor Crist also requested that the Public Service Commission pursue a 20% Renewable Portfolio Standard (RPS) by 2020, with a strong focus on solar and wind energy. The RPS has since been rescinded in the 2012 legislative session.

Baseline Emissions Inventory

The purpose of a baseline emissions inventory is to provide a snapshot of GHG emissions in a given year. A baseline inventory can be developed using two different approaches: bottom-up or top-down. A top-down approach uses an over-arching inventory (e.g., Florida's statewide inventory) and allocates emissions proportionately to smaller jurisdictions using an indicator such as population or jobs. Although this does not require a strenuous data collection effort, a top-down approach limits the accuracy and precision of a GHG inventory. It also makes it impossible to accurately track progress toward a local GHG reduction target, since the initial starting point is not precisely known. Furthermore, updates to the overarching GHG inventory would not capture the changes that occur within the jurisdiction as a result of initiatives, actions, and programs (e.g., fewer kilowatt-hours used, less waste generation etc.).

A bottom-up inventory is more precise, using empirical data from the jurisdiction to calculate GHG emissions. For example, electricity and natural gas consumption are obtained from the local utility district and used to calculate energy-related GHG emissions. In the future, as the GHG inventory is updated, the data obtained from local utilities will empirically show increases or decreases in energy consumption and GHG emissions. Therefore, the effects of local community actions can be measured more accurately using this approach. The bottom-up approach also provides a more accurate and precise measurement for reporting purposes and future grant applications. Inventories should be updated every three to five years to track and monitor progress of reduction strategies and measures.

Volusia County used a bottom-up approach to calculate its government operations inventory, and a top-down approach, based on the Florida statewide GHG inventory, to calculate the community-wide inventory.

GHGs are typically reported as metric tons of carbon dioxide equivalent emissions (MT CO_2e) to provide a standard unit of measurement across all greenhouse gases. **Appendix A** describes the methodology used to develop both baseline inventories and projections.

Government Operations Inventory

The county developed a government operations baseline emissions inventory for 2007 addressing the following emission sectors:

- energy,
- transportation,
- solid waste,
- potable water, and
- wastewater.

In 2007, Volusia County's government operations created and emitted 112,644 MT CO_2e (see **Table 1.1**). This is roughly the equivalent of the annual operation of 22,000 passenger vehicles, the CO_2 emissions from the electricity use of 14,000 homes for one year, or the carbon sequestered annually by approximately 24,000 acres of pine forests.

As shown in **Figure 1.2**, approximately 66% of Volusia County government operations emissions came from the energy sector, which includes electricity and natural gas consumption. The transportation sector accounted for approximately 23% of the inventory. This sector includes emissions associated with operation of the Volusia County fleet, Votran (public transportation system), and ground operations at the Daytona Beach International Airport. The solid waste sector contributed nearly 11% of government operations emissions, primarily associated with decomposing landfilled waste. The water and wastewater sectors contributed the remaining emissions in the inventory, which are created through the treatment, conveyance, and distribution of potable water.

The relative GHG contributions from the different sectors are important in weighing future efforts toward GHG reductions. As demonstrated by the county's 2007 baseline, reduction measures aimed at energy consumption, transportation, and solid waste will be more effective than measures aimed at the water and wastewater sectors.

Figure 1.2 – Government Operations Emissions by Sector, 2007

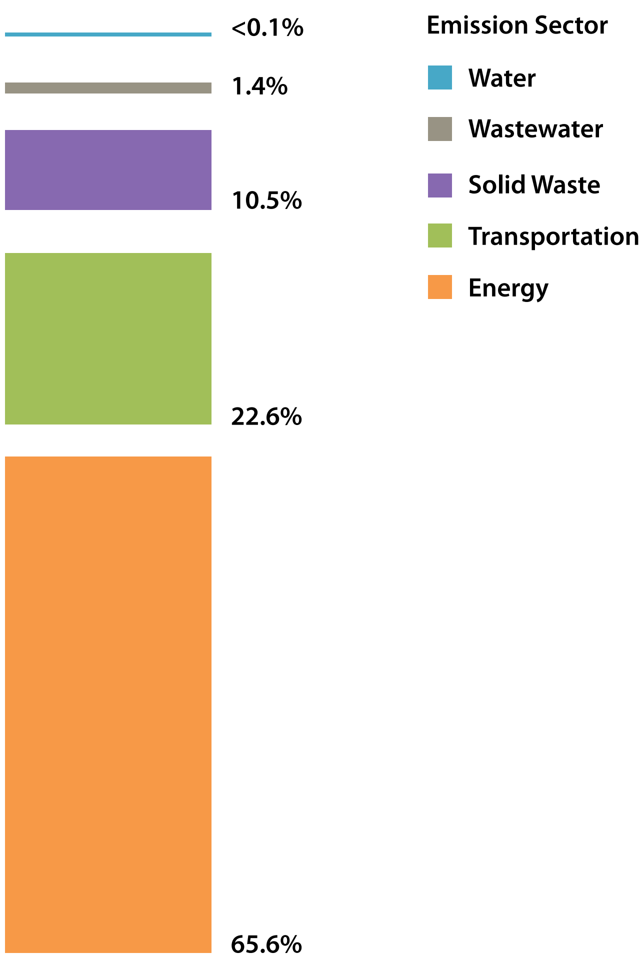








Table 1.1 – Government Operations Emissions Inventory, 2007

		2007 Emissions	
Emission Sector	**Subsector**	**MT CO_2e/yr**	**%**
Water		**1.2**	**0.0%**
Wastewater		**1,538**	**1.4%**
	Influent (CH_4)	1,502	1.3%
	Effluent (N_2O)	37	0.0%
Solid Waste		**11,807**	**10.5%**
	Disposal	2,016	1.8%
	Alt Daily Cover	193	0.2%
	Fugitive CH_4	9,598	8.5%
Transportation		**25,401**	**22.6%**
	Vehicle - Gas	9,400	8.3%
	Vehicle - Diesel	4,260	3.8%
	Equipment Fleet	3,004	2.7%
	Votran	8,725	7.7%
	Airport	13	0.0%
Energy		**73,896**	**65.6%**
	Electricity	71,256	63.3%
	Natural Gas	2,640	2.3%
Total		**112,644**	**100.0%**

MT CO_2e/yr - Metric tons CO_2 equivalent per year
Source: County of Volusia, 2011, adapted by AECOM, 2011

Community-wide Inventory

Although this SAP primarily focuses on government operations, such emissions typically represent only 3-5% of a local jurisdiction's total GHG emissions. Therefore, to provide perspective on emissions associated with community-wide (i.e., unincorporated areas, incorporated cities within Volusia County, and government operations) activity, the county also developed a community-wide inventory by extrapolating from Florida's statewide emissions inventory. As previously described, this inventory was created through a top-down approach and does not precisely reflect local conditions; it is a proportionate, scaled down version of the statewide inventory. As data becomes available for each sector, the county will eventually prepare a bottom-up community-wide inventory to measure the SAP's GHG reduction abilities.

The community-wide inventory addresses the following emission sectors:

- energy,
- transportation,
- solid waste,
- wastewater,
- agriculture, and
- stationary industrial sources.

Through the top-down approach, it is estimated that in 2007, these community-wide sources generated 6,355,903 MT CO_2e. **Table 1.2** illustrates the distribution of emissions across the sectors.

Figure 1.3 shows the relative community-wide emissions contributions of each sector. As with the government operations inventory, the majority (93%) of community-wide emissions is generated in the energy and transportation sectors, indicating that reduction measures should focus on electricity consumption and transportation within the county.

To put this community-wide emissions data in context, it is helpful to understand how Volusia County compares to other Florida jurisdictions in GHG emissions per capita. As shown in **Table 1.3**, Volusia County's per capita GHG emissions were 12.5 MT CO_2/yr, which is comparable to Palm Beach County, lower than Monroe County, Sarasota County, and higher than both Miami-Dade County and Broward County.

Figure 1.3 – Community-wide Emissions by Sector, 2007

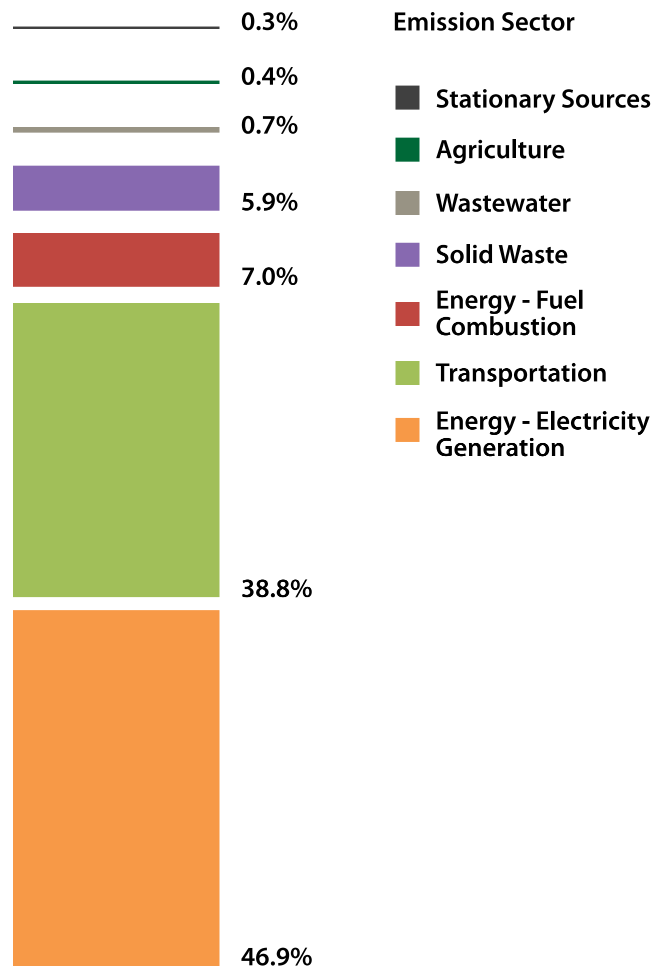


Table 1.2 – Community-wide Emissions Inventory, 2007

		2007 Emissions	
Emission Sector	**Subsector**	**MT CO_2e/yr**	**%**
Stationary Sources		**16,231**	**0.3%**
Agriculture		**25,025**	**0.4%**
	Soil Management	5,110	0.1%
	Livestock	19,915	0.3%
Wastewater		**42,878**	**10.5%**
Solid Waste		**377,087**	**5.9%**
Energy – Fuel Combustion		**447,437**	**7.0%**
	Residential	42,636	0.7%
	Commercial	104,894	1.7%
	Industrial	299,906	4.7%
Transportation		**2,465,141**	**38.8%**
	On-Road	2,201,573	34.6%
	Boats	72,675	1.1%
	Locomotives	16,715	0.3%
	Misc.	174,178	2.7%
Energy – Electricity Generation		**2,982,104**	**46.9%**
Total		**6,355,903**	**100.0%**

MT CO_2e/yr - Metric tons CO_2 equivalent per year
Source: County of Volusia, 2011, adapted by AECOM, 2011

Table 1.3 – Emissions Per Capita Comparisons in Florida

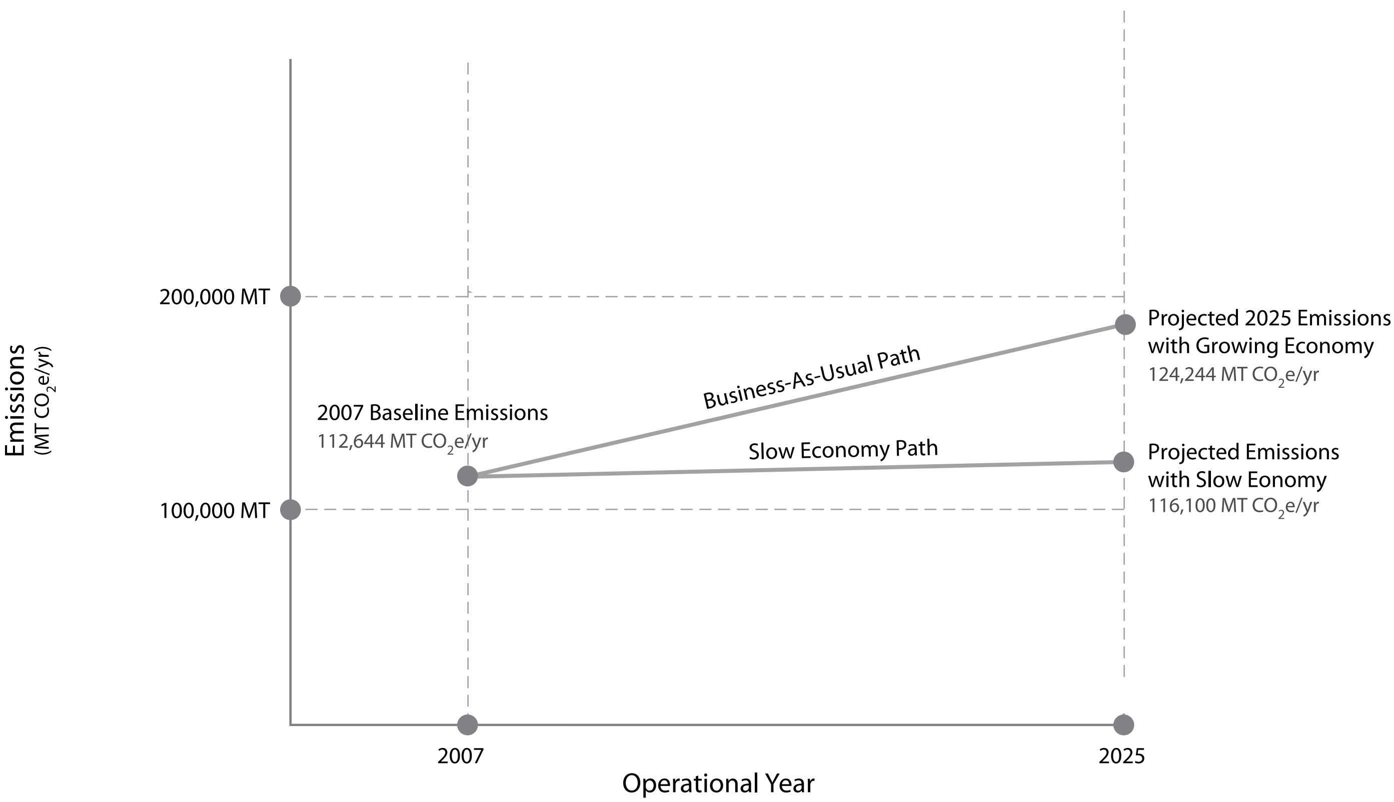
Jurisdiction	Year	Emissions (MT CO_2e/yr)	Emissions Per Capita*
Miami-Dade County	2009	26,859,326	10.7
Broward County	2009	20,810,719	11.8
City of Miami	2006	4,800,000	11.8
Palm Beach County	2009	15,675,174	12.2
Volusia County	**2007**	**6,355,903**	**12.5**
Sarasota County	2005	5,878,829	16
Key West	2005	399,952	16.7
Monroe County	2009	1,417,206	19.4

MT CO_2e/yr - Metric tons CO_2 equivalent per year
*Volusia County calculated its community-wide emissions inventory based on the Florida Statewide emissions inventory using a top-down approach. Therefore, the emissions per capita figure shown here is an approximation, rather than an exact figure based on a bottom-up inventory created from actual community utility use, waste generation, and travel data. Due to different methodological practices used to create community-wide inventories, the emissions per capita information represented here should only be used for general comparison purposes, and cannot be used to precisely compare one jurisdiction's emissions against another.

Projections of Future GHG Emissions

To understand how GHG emissions will change over time, the county used the 2007 baseline emissions and projected (based primarily on population growth) what emissions would be in the year 2025. These projections are called BAU because they assume no emission reductions resulting from statewide efforts and no implementation of the SAP goals and objectives. These emission projections provide insight regarding the scale of reductions needed to achieve the county's emissions reduction goal.

Figure 1.4 – Government Operations Emissions Potential Range of Growth



Government Operations Projections

Since government operations growth is highly dependent on property taxes and economic prosperity, it is difficult to accurately predict future growth. For that reason, the county estimated future emissions as a range of possibilities.

The county projected future government operations emissions based on anticipated population growth. However, since it is unlikely that government operations would increase at a one-to-one ratio with population growth, a scale factor of 0.65 was used to estimate average annual growth of county government operations, assuming a growing economy (see **Appendix A** for more detail on projection methodology).

If the county's economy does not continue to grow, county operations, and thus GHG emissions, would be expected to grow at a much slower rate. **Figure 1.4** shows the range of GHG emissions growth for county operations under two different economic scenarios: slow-growth and BAU. For the remainder of this SAP, we assume a growing economy, and will use the higher BAU projections.

As shown in **Table 1.4**, government operations emissions are anticipated to increase by 11,600 MT CO_2e (10.3%) between 2007 and 2025 to 124,244 MT CO_2e/yr. **Figure 1.5** shows the projected increase in GHG emissions by sector. sector.

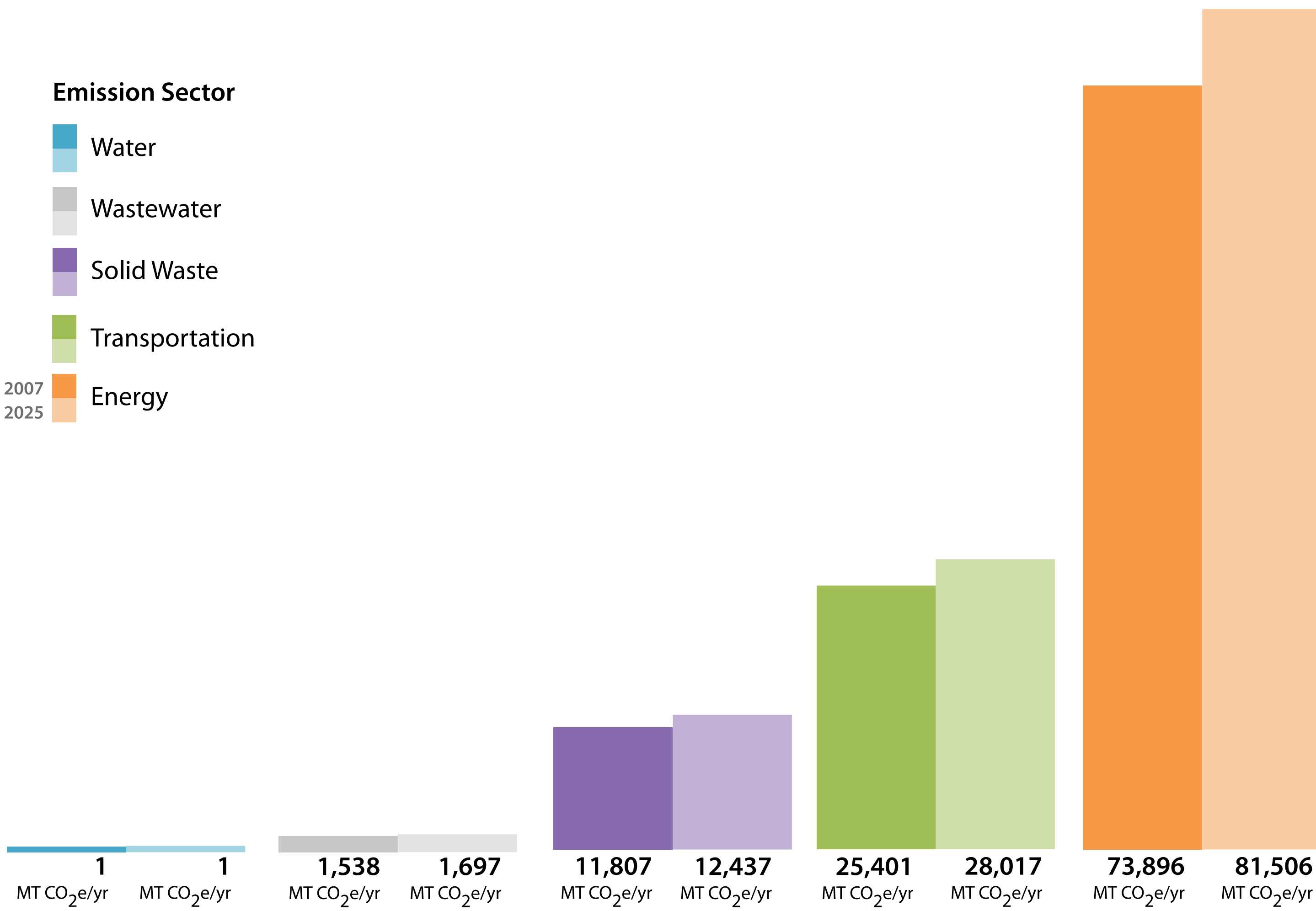
Table 1.4 – County Government Emissions Projections, 2025

		2025 Emissions (BAU)	
Emission Sector	**Subsector**	**MT CO_2e/yr**	**%**
Water		**1.2**	**0.0%**
Wastewater		**1,697**	**1.4%**
	Influent (CH_4)	1,656	1.3%
	Effluent (N_2O)	40	0.0%
Solid Waste		**12,437**	**10.5%**
	Disposal	2,224	1.8%
	Alt Daily Cover	213	0.2%
	Fugitive CH_4	10,586	8.5%
Transportation		**28,017**	**22.6%**
	Vehicle - Gas	10,368	8.3%
	Vehicle - Diesel	4,698	3.8%
	Equipment Fleet	3,313	2.7%
	Votran	9,624	7.7%
	Airport	14	0.0%
Energy		**81,506**	**65.6%**
	Electricity	78,594	63.3%
	Natural Gas	2,912	2.3%
Stationary Sources		**16,231**	**0.3%**
Total		**124,244**	**100.0%**

MT CO_2e/yr - Metric tons CO_2 equivalent per year
Source: County of Volusia, 2011, adapted by AECOM, 2011



Figure 1.5 - Government Operations BAU Emissions Growth





Community-wide Emissions Projections

The county calculated community-wide emissions projections using the Florida statewide GHG emissions inventory. The statewide inventory was scaled down to Volusia County using service population (i.e., population + employment = service population) figures for 2007 and 2025 (see **Appendix A** for additional information). **Table 1.5** indicates that community-wide emissions are projected to increase to 7,177,062 MT CO_2e/yr by 2025, an increase of 821,159 MT CO_2e from 2007. **Figure 1.6** shows the projected 2025 community-wide emissions by sector.

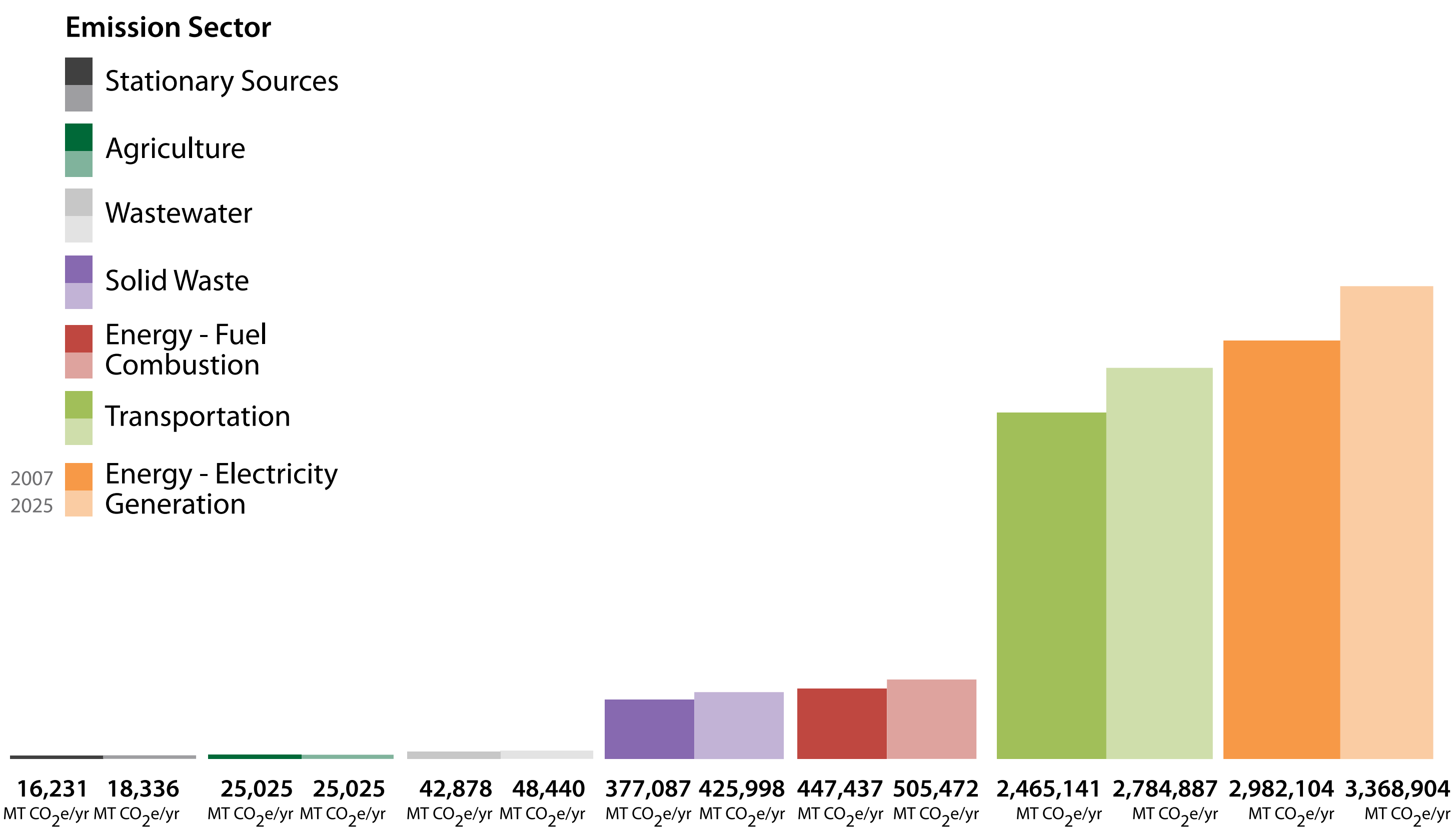
Table 1.5 – Community-wide Emissions Projections, 2025

		2025 Emissions (BAU)	
Emission Sector	**Subsector**	**MT CO_2e/yr**	**%**
Stationary Sources		**18,336**	**0.3%**
Agriculture		**25,025**	**0.3%**
	Soil Management	5,110	0.1%
	Livestock	19,915	0.3%
Wastewater		**48,440**	**0.7%**
Solid Waste		**425,998**	**5.9%**
Energy – Fuel Combustion		**505,472**	**7.0%**
	Residential	48,166	0.7%
	Commercial	118,500	1.7%
	Industrial	338,806	4.7%
Transportation		**2,784,887**	**38.8%**
	On-Road	2,487,132	34.7%
	Boats	82,102	1.1%
	Locomotives	18,883	0.3%
	Misc.	196,770	2.7%
Energy – Electricity Generation		**3,368,904**	**46.9%**
Total		**7,177,062**	**100.0%**

MT CO_2e/yr - Metric tons CO_2 equivalent per year
Source: County of Volusia, 2011, adapted by AECOM, 2011



Figure 1.6 – Community-wide BAU Emissions Growth



Emissions Reduction Target



Setting GHG emissions reduction targets for government operations and for the overall community are essential parts of the SAP. Realistic and achievable targets for the stated time horizons allow the county to measure Plan success and achievements.

Volusia County is committed to doing its part in the efforts to address climate change and proactively plan for its effects. As such, the county has set an emissions reduction target for government operations and community-wide activities of 1990 levels by 2025. Using the Florida Statewide Greenhouse Gas Inventory prepared in 2008 as a guide, this would require an emissions reduction of 20.3% from 2007 levels to reach 1990 levels. Based on the emissions inventories and projections presented above, this would require reductions in government operations emissions of 34,467 MT CO_2e. As previously described, the county will need to prepare a bottom-up community-wide inventory to establish a precise community-wide reduction target. However, based on the top-down inventory presented here, community-wide emissions reductions of 2,111,407 MT CO_2e would be required, as shown in **Table 1.6**.

Figures 1.7 and **1.8** graphically depict BAU projections and the resulting reductions necessary to achieve the county's reduction targets.

Table 1.6 – Reductions Needed to Reach 1990 Levels from 2025

	1990 (MT CO_2e/yr)	**2007** (MT CO_2e/yr)	**2025 (BAU)** (MT CO_2e/yr)	**Reductions Needed by 2025** (MT CO_2e/yr)
Florida Statewide GHG Inventory	212,390,000	266,490,000	392,490,000	180,100,000
Volusia County Operations	89,777	112,644	124,244	34,467
Volusia Community-wide	5,065,655	6,355,903	7,177,062	2,111,407*

Notes: Florida statewide inventory and projection totals were modified to reflect only those emissions sectors attributable to local jurisdictions, and therefore, do not match totals included in the Final Florida Greenhouse Gas Inventory and Reference Case Projections 1990-2025; 1990 levels for Volusia County Operations and Volusia Community-wide are calculated as 20.3% below the 2007 baseline inventory following calculations based on the modified Florida Statewide inventory shown in this table (i.e., 20.3% below 266,490,000 is approximately 212,390,000).

* This number is an estimate based on a top-down community-wide inventory
BAU – Business as usual

MT CO_2e/yr - Metric tons CO_2 equivalent per year
Source: Final Florida Greenhouse Gas Inventory and Reference Case Projections 1990-2025, Adapted by AECOM, 2012

Figure 1.7 – Government Operations Emissions Reduction Target

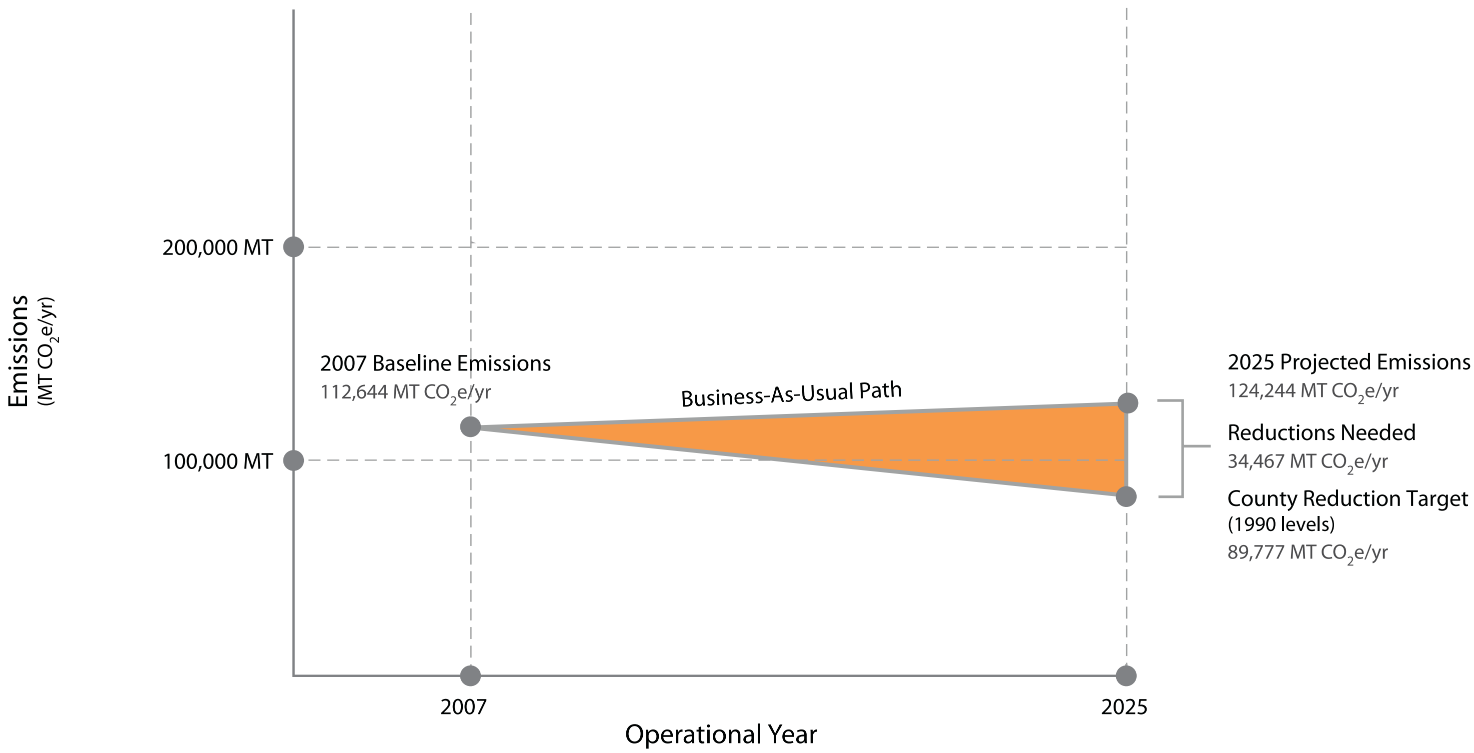
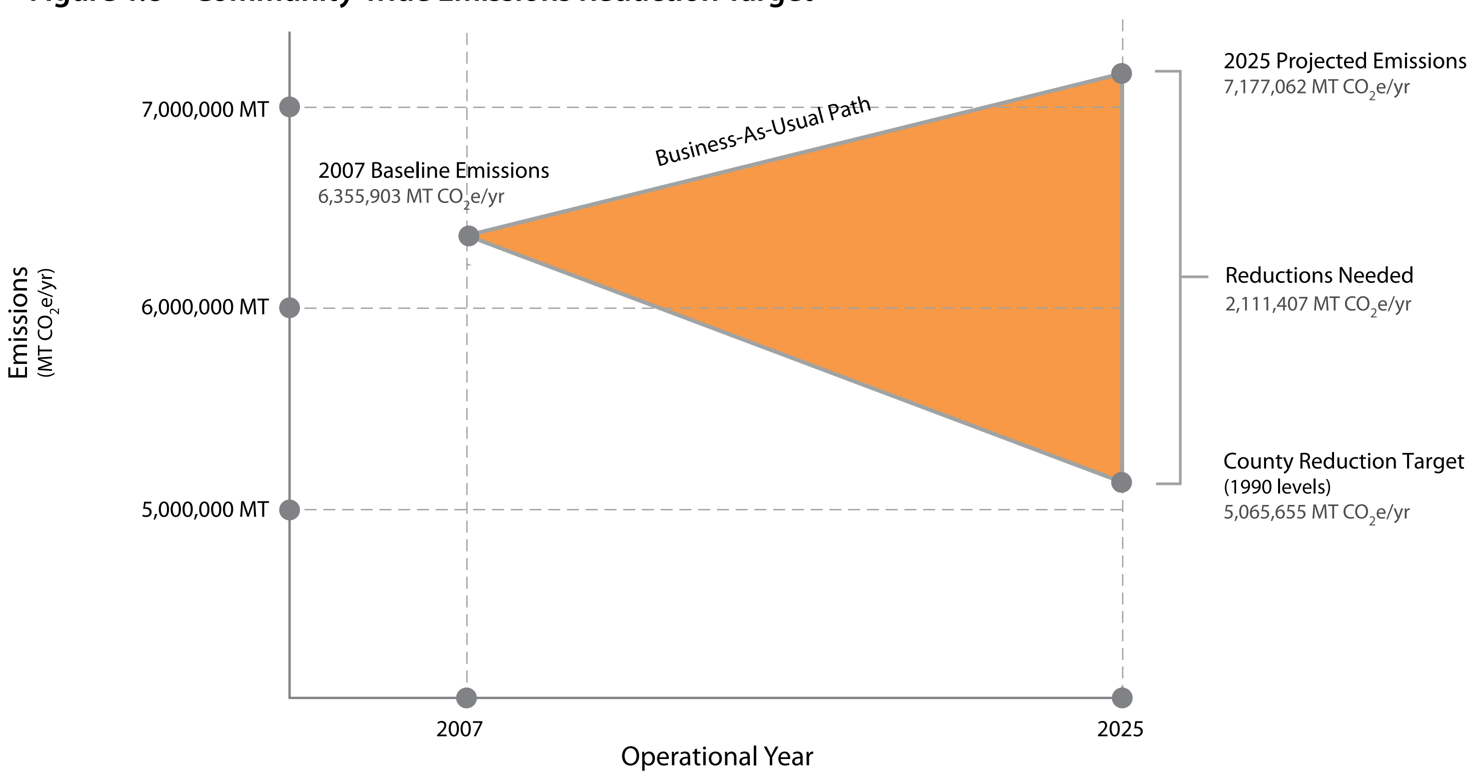


Figure 1.8 – Community-wide Emissions Reduction Target



Past and Current Successes

This SAP is one example of the commitment Volusia County has made to sustainability. Beginning in 2005 with the Smart Growth planning initiatives, and continuing in 2008 with formation of the Green Volusia program, the county has made sustainability a priority throughout the organization. In 2010, the county was designated as a Green Local Government by the FGBC.

In October 2009, the county was awarded an Energy Efficiency and Conservation Block Grant (EECBG) from the U.S. Department of Energy. That grant funded the development of this SAP as well as several other sustainability programs including:

- Development of an Office of Sustainability and Energy Management (OSEM) – to collaborate with other county departments, businesses, non-profits, and other partners to ensure the long-term economic, social, and environmental sustainability of Volusia County.
- Completion of an Investment Grade Energy Audit on 11 of the largest county buildings.
- Energy and water efficiency retrofits to county facilities.
- Development of an International Speedway Boulevard Sustainability Plan.
- Energy and water efficiency upgrades for Neighborhood Stabilization Program Homes.
- Implementation of a Green Building incentive program to provide rebates for residential, commercial, and land development projects that acquire third-party certification through the FGBC, United States Green Building Coalition, National Association of Home Builders, or the Green Building Initiative.



"Volusia County has a proud history of preserving natural resources and maintaining environmental integrity. Now, more than ever, it is important to balance environmental and economic considerations in our daily operations. A sustainable future for Volusia County, and our entire region, will be based on solutions that include environmental, economic, and social considerations."

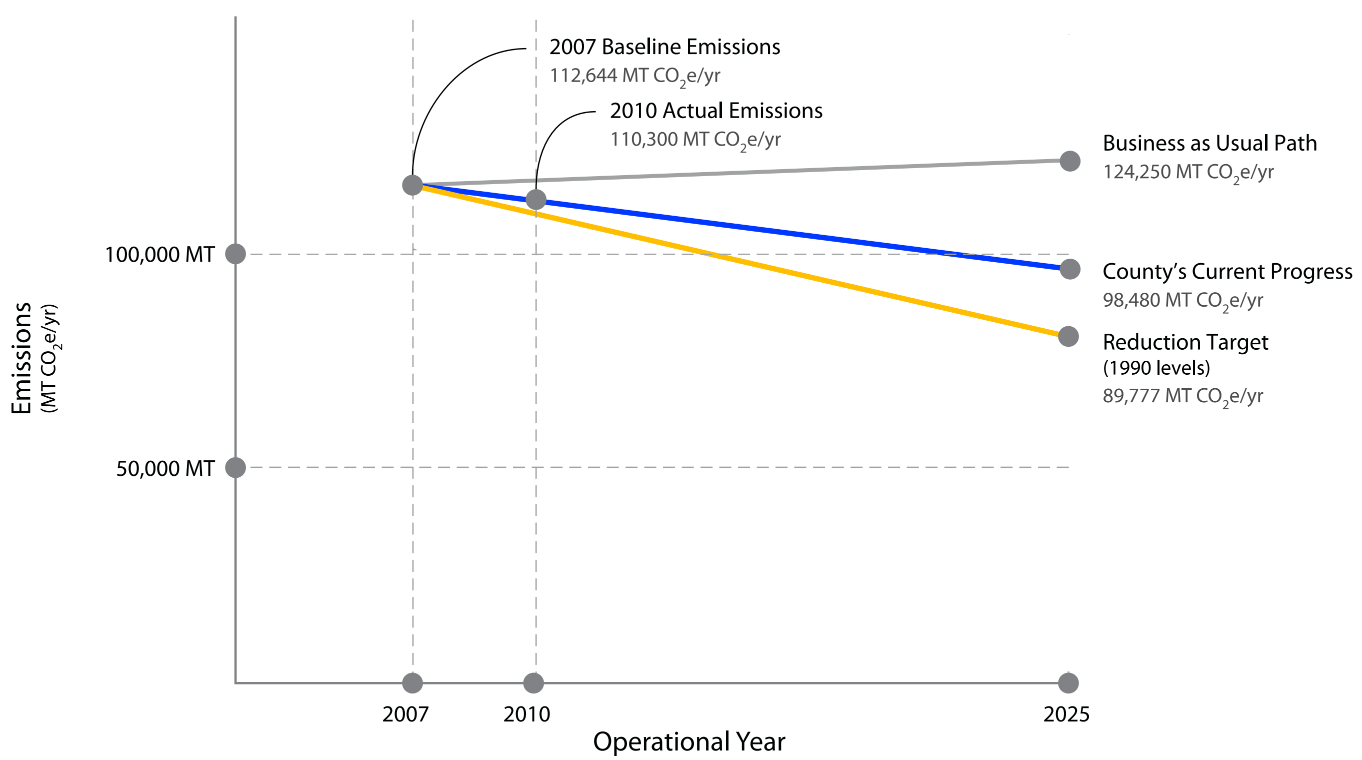
Volusia County Council

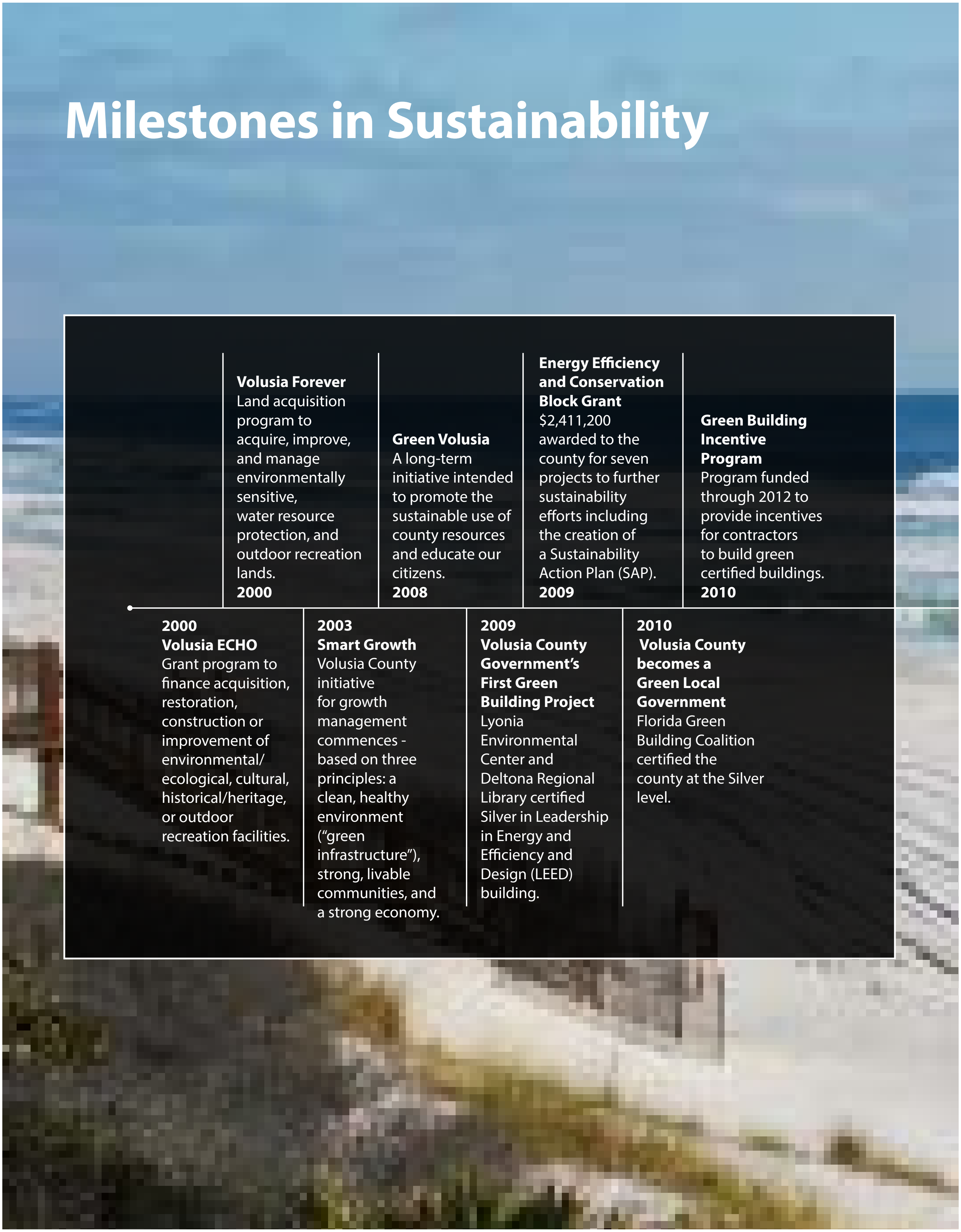
In addition to the EECBG funded activities, the county has been actively implementing sustainability projects including education and outreach, energy efficiency improvements to facilities, lighting improvements, and reductions in fuel consumption.

The county prepared an updated 2010 County Operations inventory to measure its early successes from implementation of these sustainability projects. As previously described, the county's 2007 emissions were approximately 112,600 MT CO_2e/yr. After implementing several sustainability projects, its 2010 inventory was approximately 110,300 MT CO_2e/yr. This represents a 2% reduction from 2007 levels, and demonstrates the effectiveness of the county's sustainability actions. Emissions reductions came from the energy, transportation, and wastewater sectors.

The reductions the county has achieved between its 2007 and 2010 county operations inventories started the county on the path to the 2025 target. **Figure 1.9** shows that if the current rate of reductions is continued into the future, the county will achieve a 12.6% reduction below 2007 levels by 2025. However, this calculation does not consider the effects of statewide actions, which are expected to contribute additional reductions towards the county's goal, as described in Chapter 2. This calculation also does not consider recent county projects that have been implemented to reduce GHG emissions. For example, since 2010 the county has completed projects that would reduce GHG emissions in the energy and water sectors through building retrofits, and in the transportation sector through vehicle policies and purchases. As additional data comes available, the county will calculate and analyze GHG emission reductions attained through these projects.

Figure 1.9 – Government Operations Emissions Reduction Target





Milestones in Sustainability

2000
Volusia ECHO
Grant program to finance acquisition, restoration, construction or improvement of environmental/ecological, cultural, historical/heritage, or outdoor recreation facilities.

Volusia Forever
Land acquisition program to acquire, improve, and manage environmentally sensitive, water resource protection, and outdoor recreation lands.
2000

2003
Smart Growth
Volusia County initiative for growth management commences - based on three principles: a clean, healthy environment ("green infrastructure"), strong, livable communities, and a strong economy.

Green Volusia
A long-term initiative intended to promote the sustainable use of county resources and educate our citizens.
2008

2009
Volusia County Government's First Green Building Project
Lyonia Environmental Center and Deltona Regional Library certified Silver in Leadership in Energy and Efficiency and Design (LEED) building.

Energy Efficiency and Conservation Block Grant
$2,411,200 awarded to the county for seven projects to further sustainability efforts including the creation of a Sustainability Action Plan (SAP).
2009

2010
Volusia County becomes a Green Local Government
Florida Green Building Coalition certified the county at the Silver level.

Green Building Incentive Program
Program funded through 2012 to provide incentives for contractors to build green certified buildings.
2010



2011
Green House Gas (GHG) baseline
2007 GHG emissions are established for communitywide and government operations.

County begins building retrofits
which will include energy and water efficiency improvements for ten buildings.
2011

Sustainability Action Plan
Finalized and approved by County Council.
2012

2012
County's second green building project
Construction begins on the new Emergency Operations Center, planned for a silver LEED certification.

2020
SAP Interim progress indicators
GHG emissions analyzed to identify progress towards 2025 target goal.

Florida Statewide emission goal
State to reach goal of reducing emissions by 40% from 2005 levels.
2025

2025
SAP Long-range progress indicators
Final GHG emission targets reached.

Chapter 2
Sustainability Goals and Objectives

Sustainability Goals

This chapter introduces the county's sustainability goals. Each goal is supported by sustainability objectives and implementable actions to help translate the SAP guiding principles into on-the-ground results. A summary table included at the end of this chapter identifies the sustainability benefits associated with each objective, including local job creation, increased property values, healthier resident lifestyles, financial savings, regional sustainability leadership, reduced local contributions to sea-level rise, and enhanced natural resources and systems.

This chapter discusses the following seven sustainability goals:

Provide a Healthy Economy: create a sustainable business environment, retain viable commercial agriculture operations, and provide a high quality of life through provision of community amenities such as parks, libraries, and cultural amenities.

Maintain a Healthy Environment: protect, restore, and manage natural lands, manage and protect surface water bodies, protect threatened and endangered species, and plan for adaptation to sea level rise.

Promote a Healthy Community: encourage local food production, provide for urban open space, improve opportunities for walking and biking, and protect urban tree canopies to provide for the continued health of Volusia County's residents, businesses, and visitors.

Encourage Efficient Transportation and Community Design: reduce automobile fuel consumption and emissions, improve pedestrian and bicycle infrastructure, enhance public transit service, support pedestrian and transit-oriented development, and discourage single-occupancy vehicle use.

Conserve Water and Promote Water Efficiency: conserve potable water supply through conservation measures applicable to both indoor and outdoor water use in existing buildings and new construction.

Conserve Energy and Promote Renewable Energy: encourage energy efficiency retrofits for existing buildings, enhance energy performance for new construction, increase use of renewable energy, improve community energy management, provide alternative fuel options, and improve the county's vehicle fleet.

Reduce Waste and Promote Recycling: build on past county successes to identify strategies to increase waste diversion rates and educate residents to become well-informed consumers.

Provide a Healthy Economy

A healthy economy is essential to sustainability, as it provides for the people and resources to support a strong community. In the same way we understand the natural world as an ecosystem of inter-connected organisms, a vibrant economy is an ecosystem of inter-connected products, services, and people working together in an intricate web.

Our sustainable future requires that we acknowledge the balance between economy, environment, and community to create new opportunities and build a diverse economic foundation.

Objectives

1. Develop a vision through consensus to promote, maintain, grow, and attract businesses.

Implementing Actions

- Continue assessing current economic initiatives and previous planning efforts.
- Identify barriers to maintain and grow industry.
- Identify champions within the business community to engage with, shape, and promote the vision.
- Identify incentives to maintain and grow current businesses.
- Provide public information describing current initiatives and opportunities, and share success stories.
- Create a Sustainable Business Alliance to assist business owners in reducing operating costs through resource efficiency.

2. Promote a broad range of jobs for all age groups and skill types.

Implementing Actions

- Create (or build with the Center for Business Excellence) a job placement and career center for students that focuses on keeping them within the county after graduation.
- Promote Business Assistance Service Providers such as the Small Business Development Center (SBDC), the University of Central Florida Business Incubation Program, and the SCORE small business mentoring program.

Economy or Environment?

Sustainability is often thought of as an environmental issue; one to be considered only from the perspective of natural resources. But in truth, our local, regional, national, and global economies are integral to sustainability planning. Stable jobs, housing, and food markets are required to protect environmental integrity. One only has to think about the unsustainable practices of some developing countries to realize that economic instability leads to greater environmental degradation.

As in all things, the economic needs of a community must be balanced. Rampant industrialization (or growth) without thought to protection of resources is unhealthy, just as protection of the environment to the exclusion of the economic and social needs of the community is unwise.

Environment, society, and economy work together to create a sustainable community.

3. Provide community amenities, such as recreational, entertainment, and cultural experiences, which enhance the quality of life in Volusia County and attract and retain businesses.

Implementing Actions

- Create a web page that identifies existing amenities, and promote the web page to residents and businesses.
- Where needed, improve access to community amenities.
- Conduct a gap analysis, and survey residents and businesses to determine the need for new community amenities.

4. Retain viable commercial agricultural operations in Volusia County.

Implementing Actions

- Support local food producers through county purchasing policies.
- Create a database of commercial agricultural operations within Volusia County and promote those businesses through a searchable web option.

5. Encourage low-carbon, and/or clean/green technology, businesses, and industry.

Implementing Actions

- Work with local universities and schools to promote and create internship opportunities, green careers and entrepreneurship opportunities, and to promote emerging technologies.
- Provide incentives for such businesses to locate in Volusia County.
- Encourage public/private partnerships to develop and utilize green technology.
- Integrate sustainability criteria into existing county economic development programs.

6. Expand (or support) our tourism and trade industries.

Implementing Actions

- Enhance and market the sustainability of the Ocean Center and Daytona Beach International Airport.
- Explore options for hosting green events, including working with Clean Cities and other organizations.
- Explore a voluntary carbon offset purchasing program for conventions, conferences, large events, and individual travelers.
- Work with the tourism authorities to promote Volusia County as a "sustainable" vacation destination.
- Encourage hotel/motel industry participation in the Florida Green Lodging Program to promote sustainable practices. Provide promotional opportunities for green lodgings.
- Promote green/sustainable building and renovation practices within the lodging industry.



"Sustainable communities are places that foster and maintain a high quality of life. This requires a strong local economy that provides all residents with the opportunity to share in prosperity and enjoy the benefits of a clean environment. A healthy local economy also helps to ensure the fiscal health of the community's public agencies."

Steve Sanders, Institute for Local Government

Maintain a Healthy Environment

Our natural environment, and the resources within it, form the foundation of our culture. The water, land, air, and animals that make up the ecology of Volusia County sustain us and provide a quality of life that supports our community and our economy. A healthy environment is fundamental to a healthy community and a healthy economy; we cannot truly have any one without the other.

Our sustainable future relies on understanding the dynamic nature of our environment and on protecting, enhancing, and restoring our natural environment, to ensure diversity and the ability to adapt to changing conditions. We must recognize that natural systems are the equivalent of green infrastructure and are neccesary to our way of life.

Objectives

1. Continue to cultivate a culture of natural resource protection to ensure that our residents, businesses, and visitors recognize the importance of clean water, clean air, and diverse, healthy ecosystems.

Implementing Actions

- Continue to educate our residents, businesses, and visitors regarding the valuable ecosystem services provided by natural lands, and the effect they have on quality of life.
- Continue to engage the community in natural lands protection efforts through volunteer activities and environmental education.
- Continue to be a leader in the preservation of natural resources, and publicize successful natural lands conservation efforts.

2. Expand, protect, and restore publicly-owned natural lands.

Implementing Actions

- Identify a process for the continued acquisition and long term management of conservation lands (e.g. continuation of Volusia Forever).
- Continue to manage the county's conservation lands using a program of professionally accepted principles of resource and ecosystem management for the benefit of, and enjoyment by, present and future generations. Management objectives may include:
    - carbon sequestration,
    - preservation of habitat for wildlife including threatened and endangered species, and
    - opportunities for public access.
- Explore alternatives for creating a carbon fund where individuals can contribute to offset their carbon footprint. Work with the Ocean Center and Economic Development Division to promote green meetings through this carbon offset.
- Continue to provide public information describing land management techniques and the interdependence of species and ecosystems.

What are ecosystem services?

Most people understand that natural ecosystems provide recreational and aesthetic benefits to humans as well as habitat to a myriad plant and animal species. Less understood are the many services that ecosystems provide behind the scenes.

The term ecosystem services refers to the natural functions of a complex system of physical, chemical, and organic components that produces resources that we depend on for survival. Some of the most important ecosystem services are maintenance of soil fertility, agricultural productivity, pollination, water filtration, flood and tidal protection, improved air quality, regulation of climate, urban heat island control, insect pest control, and maintenance of genetic resources.

Elimination of any of these, or the many other services provided by healthy ecosystems can result in significant costs to humans.

3. Incentivize the protection of natural areas on private lands, including agriculture.

Implementing Actions

- Implement policies to protect the Environmental Core Overlay (ECO) by encouraging development in urban areas.
- Develop policies to quantify and create a market for incentivizing the protection of ecosystem services on private lands.
- Work with private landowners to identify benefits for the sequestration of carbon in natural lands.
- Adopt policies that discourage the conversion of agricultural land to sprawl development.
- Encourage farmers to provide areas for native wildlife in their farming operations.

4. Manage and protect ground water and surface water bodies.

Implementing Actions

- Adopt restrictions on fertilizer application to reduce surface and ground water pollution.
- Promote the use of living shorelines, minimizing the armoring of natural shorelines.
- Adopt Low Impact Development strategies to mitigate flooding from stormwater, capture pollutants prior to release into receiving water bodies, and allow for recharge of our aquifer.
- Protect and restore wetlands and salt marshes, which act as natural filters for water quality.
- Promote public education relating to the effects of pollution on water bodies and wildlife.

5. Plan for adaptation to sea level rise and dynamic climate conditions.

Implementing Actions

- Incorporate potential sea level rise scenarios into land acquisition, public infrastructure, and land development decisions to ensure the ability to adapt to changing conditions.
- Incorporate changing climate conditions into hazard mitigation planning efforts.
- Encourage coastal cities to adopt adaptive design strategies, which could include coastal setbacks, density restrictions, and rolling easements.
- Continue to develop a high-value conservation core connected with statewide conservation lands that allow movement of plants and animals across the region.
- Encourage the restoration of tidal wetlands and salt marshes, as they are considered one of the most valuable ecosystems for the sequestration of carbon.

Can ecosystem services be measured?

It is difficult to assign a monetary value to many of the services provided by ecosystems, as many of these services appear to be free. In truth, if these services are lost, the cost to replace them would truly be staggering.

For example, over 100,000 different animal species — including bats, bees, flies, moths, beetles, birds, and butterflies — provide pollination services. One third of human food comes from plants pollinated by wild pollinators. The value of pollination services from wild pollinators in the U.S. alone is estimated at four to six billion dollars per year (Ecological Society of America, 2000).

Other services, such as fertile soil, are related to the economic productivity of a region, and the prosperity of its residents and businesses. Maintaining functioning natural systems, and reaping the benefits of the services they provide, are critical to our society and economy.



Promote a Healthy Community

Living sustainably results in a healthier community. Personal health is improved through access to fresh foods, recreational opportunities, and outdoor environments. In turn, these promote a quality of life that improves our local economy.

Our sustainable future depends upon a healthy, active population with less reliance on fossil fuels for transportation and the delivery of goods and services.

Objectives

1. Create a culture that promotes sustainable and healthy lifestyles.

Implementing Actions

- Promote and support community initiatives in school systems to include:
  - school gardens,
  - healthy food in school cafeterias,
  - food education and awareness,
  - safe-routes-to-school programs, and
  - opportunities for active and healthy after school programs or activities on school properties.
- Increase safe walking, bicycling, and driving through educational and public awareness programs.
- Create public and private partnerships to foster and adopt these initiatives.
- Develop a funding mechanism to implement these initiatives.

2. Facilitate discussion and collaboration to improve awareness of preventive care and wellness.

Implementing Actions

- Connect regional healthcare partners in efforts to provide public health awareness.
- Develop private/public partnerships to develop an educational campaign on healthy eating and lifestyles.
- Develop and promote age-specific education initiatives on health maintenance by using data gathered on the healthcare trends of the target demographics.

3. Support and incentivize local food production and distribution.

Implementing Actions

- Remove regulatory barriers that prohibit private community gardens.
- Support initiatives to create community gardens on public lands where appropriate.
- Create public/private partnerships between grocers and food establishments to facilitate a distribution network for locally produced foods.
- Promote local farmers markets initiatives.
- Support a Buy Fresh, Buy Local campaign.

What is healthy community design?

Healthy community design is planning and designing communities to make it easier for people to live healthy lives. Healthy communities offer important benefits, such as:

- Decreased dependence on cars by building homes, businesses, schools, and parks closer to each other so that people can easily walk or bike between them, which promotes physical activities.
- Improved air quality from decreased vehicle use.
- Increased social connections and sense of community.
- Reduced contributions to greenhouse gases.

4. Promote ways to engage the community and market our public community assets (e.g., parks, greenways, blueways) to promote healthy outdoor activities.

Implementing Actions

- Develop a mechanism that allows community participation in the maintenance and support of public parks and community assets.
- Create an awareness campaign that identifies and publicizes opportunities for access to public lands and highlights free family activities available to the community.
- Support school trips to outdoor assets and county-owned public facilities.

5. Protect and promote an urban tree canopy that improves air quality.

Implementing Actions

- Identify areas in need of additional tree cover, and plant a minimum of 500 trees in year one, with an annual increase of 10% over the next 5 years. Encourage public participation in tree planting and restoration projects.
- Provide public information describing the benefits of planting additional trees.
- Partner with municipalities and private entities on tree planting programs, modeling the NASCAR Green "Clean Air Tree Planting Program" , to offset carbon emissions.

6. Design and enhance trail infrastructure that promotes and supports connectivity to community amenities and commercial enterprises.

Implementing Actions

- Support the creation of destinations along bike trails to encourage use of the trail systems.
- Reduce barriers to infill redevelopment and promote good community planning that includes design considerations for transit, walkability, and connectivity.
- Initiate bike share programs.
- Create an awareness campaign to promote events along the trail systems, such as an Annual Trails Day event.

7. Minimize the environmental impact of development within the county through sustainable building practices.

Implementing Actions

- Provide incentives for builders and developers to build green buildings and developments.
- Promote green building practices for new construction and for retrofits to existing buildings.
- Develop a public outreach campaign that identifies the benefits of green building practices.
- Construct all new county facilities to recognized green building standards [e.g. Leadership in Energy and Environmental Design-New Construction (LEED-NC) and FGBC].



"To be sustainable, communities need more efficient and effective strategies and approaches that protect and improve community health, while they simultaneously protect and improve nature's benefits."

EPA, Science in Action, April 2011

Encourage Efficient Transportation and Community Design

Sustainability and resource conservation are inextricably linked to the way we design our communities. The quantity of fossil fuels consumed, and the amount of greenhouse gases (GHGs) released, is correlated with our transportation patterns and dependence on automobiles. Well designed communities and transportation systems can provide a high quality of life, revitalize economic activity, and provide numerous environmental benefits. Reducing vehicle miles traveled has direct benefits to air quality and reduction of GHG emissions.

Our sustainable future depends on our willingness to design our infrastructure and communities in a way that promotes walkable communities, affordable housing and transportation options, and preservation of natural resources. The objectives and action steps to meet this goal build upon the county's Smart Growth planning initiatives.

How does community design impact sustainability?

The only way we can make a real difference in our impact on the global environment and climate is through a holistic approach to policy, planning, engineering, and design, wherein all work collaboratively toward the common goal. That goal must be the functional integration of the built and natural environments. Built environments should be viewed as the extension of natural environments, allowing natural systems to function and working with these systems in high-performance buildings and landscapes. At the same time, we must not lose sight of our goals of economic productivity and social equity.

- Joe Brown, Climate Design

Objectives

1. Create a culture of planning and designing our communities and transportation systems to encourage alternative forms of transportation.

Implementing Actions

- Inform residents and businesses of the benefits of efficient design.
- Inform residents and businesses of available public transit options between their neighborhoods and work and daily goods.
- Encourage the use of alternative transportation options including walking, biking, and public transit.

2. Reduce vehicle miles traveled for county business and for county employee commuting.

Implementing Actions

- Invest in technology to allow for remote access meetings (e.g., smart boards, conferencing software).
- Encourage ridesharing for county meetings in remote locations.
- Support options that allow inspectors and other field personnel to have remote access to inspection schedules to reduce trips to the duty station (for example, start from remote locations).
- Implement commute trip reduction programs for county employees. The program could include strategies such as:
  - participate in the Florida Department of Transportation Rethink commuter assistance program,
  - provide transit pass subsidies to employees,
  - encourage the use of vanpools among employees that serve as an additional workplace benefit, and
  - provide bicycle lockers, shower facilities, and changing rooms.

3. Promote opportunities and incentives for other employers in Volusia County to reduce vehicle miles traveled for employee commuting.

Implementing Actions

- Explore opportunities for shared telecommuting infrastructure among private employers and municipalities within the county.

- Provide incentives for major employers and local governments within the county to implement commute trip reduction programs.
- Promote existing carpool and vanpool services offered through Votran.

4. Encourage land use design that reduces vehicle miles driven and automobile dependence.

Implementing Actions

- Encourage and incentivize development within designated infill and redevelopment corridors. Infill development capitalizes on existing urban services, which can accommodate new or changing populations without stretching into remote areas of the county.
- Revise the zoning code to allow mixed use development within designated corridors. Mixed use development comingles residential uses with employment, entertainment, and convenience uses, creating vibrant live-work-play communities, thus reducing commuter trips.
- Revise the zoning code to incentivize neighborhood centers that place uses such as parks, schools and neighborhood-serving retail within walking distance of residential uses.
- Revise the zoning code to promote shared parking in mixed use areas and to establish maximum parking requirements instead of minimum parking requirements. Large and open expanses of underutilized parking areas push uses apart, which increase the reliance on driving personal vehicles.
- Revise the zoning code to promote bicycle parking requirements for new development.
- Promote land conservation programs that preserve land in outlying areas for rural and environmental uses. Maintaining low development intensities in these areas limits the potential for sprawl in outlying areas that results in increased vehicle miles driven.
- Explore zoning code revisions that increase allowable development intensities in areas served by transit. Accommodating population and employment growth in transit-served areas places more residents within access of existing services, while also allowing transit to be provided more cost-effectively.
- Promote existing standards and guidelines developed by Votran that address transit-supportive site and building design.

5. Encourage and implement transit infrastructure improvements, increased choice ridership, and alternative transportation opportunities.

Implementing Actions

- Invest in Complete Streets design and construction for designated county thoroughfares. Complete streets provide safe, attractive, and comfortable access for all users including pedestrians, bicyclists, motorists, and public transit.
- Explore funding options for transit that will allow for increased service, such as a dedicated funding source or a transit impact fee.
- Promote the safety and comfort of transit users through facilities such as covered waiting areas and information kiosks.



Automobiles account for nearly half of global oil consumption; individual transportation choices have a significant cumulative impact on the global climate.

Conserve Water and Promote Water Efficiency

Water is vital to the survival of everything on the planet and is limited in supply. While water may seem to be abundant, less than one percent of all water on earth is available for human use. Potable water is critical to every person in Volusia County; it is integrated into all aspects of our daily lives and is the foundation of our economy and environment.

Our sustainable future requires that we treat water as the finite resource that it is, and make wise use of all water sources available.

Objectives

1. Create a culture of examining water use holistically, with an overall strategy for potable water, alternative water sources, use of grey water, rainwater, and stormwater.

Implementing Actions

- Publicly celebrate water as an essential, shared community resource through all available venues.

2. Improve indoor water efficiency and conservation in county operations, and the treatment and delivery of water through the county's utilities.

Implementing Actions

- Conduct water audits in county facilities to identify potential improvements.
- Implement water efficiency and conservation improvements in county facilities to reduce water consumption by 7% by 2015 and 20% by 2025.
- Provide educational material to county employees regarding water consumption and conservation strategies.
- Improve water distribution efficiency through improvements in water and sewer infrastructure to reduce leakage and waste of water.

Water conservation or water efficiency?

Many people use these terms interchangeably, however they really are different. Conservation refers to using less of something, like turning off the water to brush your teeth or eliminating outdoor irrigation. Efficiency is related to how much use we get out of each drop of water, such as using the same water more than once or buying a washing machine that washes more clothes per gallon.

Is one better than another?

A sustainable water strategy requires both conservation and efficiency. Throughout this chapter you will see actions that relate to both, so that we can best protect one of our most precious resources.

Turf grass is one of the most water-intensive plants in a landscape. Its high water demands and frequent maintenance needs make it a resource-intensive option. Reducing the amount of irrigated turf grass reduces GHG emissions. Planting vegetation with minimal water needs, such as Florida-native species, choosing vegetation appropriate for the conditions at the project site, and choosing complementary plants with similar water needs can dramatically reduce landscape water demand.

3. Improve outdoor water efficiency and conservation in county operations.

Implementing Actions

- Replace high water need landscapes with xeriscape or Florida-friendly landscaping to reduce potable water consumption.
- Eliminate potable water use for landscaping at all county facilities by 2015.

4. Promote indoor water efficiency and conservation in the community.

Implementing Actions

- Conduct free indoor and outdoor water audits for residential and commercial utility customers.
- Renew rebates for water-efficient appliances and fixtures for county utility customers.
- Promote third-party water conservation programs such as the St. John's River Water Management District's WaterStar to permit applicants.
- Adopt water conservation requirements in the building code.

5. Promote outdoor water efficiency and conservation in the community.

Implementing Actions

- Assure implementation of the county's Water Conservation Ordinance. The county would ensure compliance with the Ordinance through: (1) implementation of a post-construction spot monitoring program; (2) water efficiency training for irrigation designers and installers.
- Provide a rebate to county utility customers who replace turf grass with native drought-tolerant plant material.
- Promote greywater and rainwater systems for landscape irrigation. The program could provide: (1) county-sponsored demonstration projects; (2) provision of technical assistance regarding installation and maintenance; and (3) outreach and education to the building industry.
- Provide rebates to county utility customers for installation of water-efficient landscape irrigation control systems. The county would provide rebates to owners of existing landscapes that convert to weather-based smart irrigation technology.
- Provide Land Development Code incentives for development forms that require less landscaping and irrigation (e.g., clustering, central irrigation).
- Adopt building codes that allow and encourage the installation of rainwater harvesting systems in new construction.
- Approve an ordinance that restricts homeowners' associations (HOAs) from requiring sod lawns (i.e., universally allow Florida-friendly plants).
- Incrementally implement a policy to eliminate the use of potable water on landscapes.

6. Develop outreach and education programs to promote the importance of our water resources.

Implementing Actions

- Promote existing water conservation programs through additional outreach, including targeted marketing and workshops for residential and commercial customers.
- Work with the Volusia County School Board to ensure that a water conservation curriculum is mandatory in multiple grades.
- Broaden application of the St. Johns River Water Management District Great Water Odyssey curriculum to students.
- Educate consumers through advertisements in electronic media and social networks.
- Continue to update and market the county's water conservation efforts through our web page, Volusia.org/water.
- Partner with the University of Florida Institute of Food and Agricultural Sciences to educate homeowners about Florida-friendly landscaping.
- Promote and develop sites that show case water conservation practices. For example through landscaping, use of low flow fixtures, use of greywater.



7. Develop policies to ensure sustained recharge of the Floridan aquifer and the availability of stormwater for public use.

Implementing Actions

- Modify the Land Development Code (LDC) to promote pervious parking in appropriate locations.
- Adopt maximum parking standards.
- Support land acquisition in conservation corridors. Promote the benefits of the land for aquifer recharge.
- Promote the use of stormwater/reclaimed water for irrigation (reservoir), and consider ways to allow retention ponds to store reclaimed water.
- Encourage Low-Impact Development (LID) that uses methods of stormwater treatment closer to the source of runoff.
- Seek partnerships with universities for research and development into alternative water sources and treatment.

Water is one of our most precious resources, and the demand for it increases with each passing year. Conservation is the key to ensuring that we have a sufficient supply of this precious resource for generations to come.

Conserve Energy and Promote Renewable Energy

Energy, in the form of electricity, natural gas, and vehicle fuels, quite literally powers our community. We depend on a reliable source of energy for powering our homes, schools, businesses, and vehicles. Our primary sources of energy are fossil fuels, the consumption of which releases carbon dioxide and other GHGs into the atmosphere, with deterimental effects on both human health and the global climate.

Our sustainable future relies on reducing consumption of fossil fuels through conservation and efficiency, and on the use of alternative and renewable energy sources that are less harmful to people and the environment and create a financial benefit.

What is solar photovoltaic?

Photovoltaic (PV) systems generate electricity by exposing silicon chips to light from the sun. The silicon chips are arranged into two layers of semiconductors, one with a positive charge and one with a negative charge, similar to a battery. When these two semiconductors absorb light, their electrons get excited, and travel through a circuit as electricity.

Solar PV systems consist of many semiconductors put together in arrays, which can be installed on all types of surfaces including roofs, parking structures, stand alone structures, and even vehicles. In this way, electricity can be generated right where you need it, rather than created and distributed through a larger grid system. Perhaps the greatest benefit is that solar PV creates no harmful GHGs.

County Operations Objectives

1. Create a culture of energy efficiency and conservation that encourages the use of alternative energy sources.

Implementing Actions

- Identify and publish successes and programs to the public and commercial businesses through an annual report card, and creation of a media press kit as appropriate.
- Promote energy awareness through education on energy efficient improvements and available programs.
    - Provide and regularly update a website with a living document theme, with educational information, and links to other agencies and resources.
- Identify and publicize best energy practices for residential and business properties.

2. Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 levels by 2025.

Implementing Actions

- Perform building energy audits to assess performance and identify areas for energy improvements.
- Install smart grid or smart metering technology to show exactly where and when electrical power is being used.
- Implement low-cost to no-cost energy efficiency measures as a preliminary first effort toward efficiency to reduce county facility energy use. These would include controlling temperatures 2-3 degrees higher in the summer and 2-3 degrees lower in the winter, installing automated thermostats that assure lights and HVAC systems are turned off or down when buildings are not occupied.
- Prioritize other energy improvements and implement as funding is available.
- Install solar thermal hot water systems in county facilities, where appropriate.
- Provide employees with information about saving energy in the workplace (e.g., water management, HVAC control, appliances, and lighting).
- Reduce energy consumption and major energy loads by cutting back on power usage at peak times (demand-side management).

3. Improve energy efficiency and conservation of public realm lighting, which includes streetlights, pedestrian pathway lights, area lighting for parks and parking lots, and outdoor lighting around public buildings.

Implementing Actions

- Retrofit county-owned streetlights and parking lots with higher efficiency technologies.
- Install a pilot project for high efficiency or solar ballfield lighting.
- Promote the retrofit of existing parking lot lighting through targeted outreach to landowners and tenants.
- Adopt an ordinance that requires new commercial development to utilize high efficiency lamp technologies, and/or solar light fixtures.

4. Ensure that 10% of the county's utility consumption is from renewable sources by 2015, 20% by 2025.

Implementing Actions

- Install solar PV at the county facilities, potential sites include the closed landfill in DeLand, the Tomoka Landfill, or Airport property.
- Investigate wind-generation research in conjunction with the Department of Economic Development to partner with wind generation researchers on a pilot installation project.
- Partner with organizations (such as the Florida Solar Energy Center and local universities) on alternative energy projects.

5. Reduce the amount of petroleum-based fuels used in county vehicles by 15% by 2015 and by 30% by 2025.

Implementing Actions

- Complete an alternative fuel plan that will address the use of biodiesel, compressed natural gas (CNG), propane, ethanol, and electricity as an alternative for petroleum-based fuels.
- Increase alternative fuel vehicles in the county's fleet.
- Explore the use of emerging technologies that prolong the useful life of oil.
- Provide an electrification infrastructure throughout Volusia County to provide appropriate support for electric and plug-in hybrid electric vehicles.
- Partner with existing efforts in the state of Florida, including Clean Cities, Get Ready Groups, Regional Planning Councils, and Economic Development groups, to identify funding sources.
- Install and operate a biodiesel processing plant using local waste vegetable oil from restaurants as feedstock.
- Partner with a local university and the Clean Cities Program to evaluate the efficiency of CNG and propane vehicles. Determine the efficiencies Volusia County can gain by acquiring these vehicles.
- Participate in Fleet Management efforts to integrate alternative fuels in solid waste vehicles.

Community-wide Objectives

6. Promote energy efficiency and conservation in existing commercial and residential buildings with a target of 10% reduction in energy usage from 2007 levels by 2015, and 15% by 2025.

Implementing Actions

- Educate residents and businesses about the commercial and residential audits that are available from utility companies.
- Encourage building owners and tenants to utilize the EPA ENERGYSTAR Portfolio Manager to monitor their building energy efficiency.
- Promote existing incentive programs through additional outreach, for example: (1) create a one-stop center for information on energy conservation (greenvolusia.org); and (2) organize workshops with information from utilities or agencies.
- Develop a shade tree assistance program and provide subsidized shade trees to residential and commercial property owners.
- Explore opportunities to partner with the Division of Economic Development on incentive programs for Volusia County businesses that reduce energy use in their buildings.
- Work with utility companies, other jurisdictions, and organizations to accelerate Smart Grid technology integration in the community.

7. Improve energy efficiency and conservation in new private buildings, with a target of 20% of new construction built to ENERGY STAR standards.

Implementing Actions

- Provide incentives for new developments that voluntarily achieve or exceed ENERGY STAR standards. Incentives can include reduced permitting fees and priority permit review.
- Adopt the 2009 International Energy Conservation Code, which will increase energy efficiency in new buildings by 17%.

- Promote green building practices and existing utility incentive programs and provide additional outreach to promote these programs.
- Require planting of building shade trees in new communities to reduce summer air conditioning electricity demand.
- Require preservation of existing vegetation in new developments to reduce energy requirements, and to improve water and air quality.

8. Promote the development and use of alternative energy sources in the community.

Implementing Actions

- Inform businesses and residents of available solar energy rebates.
- Provide targeted outreach to developers and builders about renewable energy incentives and energy efficiency programs offered by the Florida Solar Energy Center, U.S. Department of Energy and energy utilities when they apply for permits, and encourage them to participate.
- Partner with local environmental groups to promote available alternative energy sources.
- Develop a streamlined permitting program for installation of PV systems and solar hot water heating systems.
- Adopt a county policy providing preference to vendors who use a percentage of alternative fuel vehicles.

9. Promote the use of alternative fuels community wide.

Implementing Actions

- Work with Clean Cities to develop a local marketing program.
- Expand the electrification infrastructure to allow private, fee-based use of charging stations.

What is solar thermal?

Solar thermal energy is anything, usually air or water, warmed up directly by the sun's rays.

The sun's heat can be used in two ways within homes and businesses. The sun is used to heat water for domestic hot water systems, or the sun's light can be concentrated and water temperatures increased to make steam and electricity.

Residential solar hot water heaters can reduce natural gas consumption by 40-70%, in addition to not producing air pollution or GHGs.







Reduce Waste and Promote Recycling

County governments are often tasked with the collection and disposal of solid waste, which requires land and energy and contributes to the generation of GHGs. Volusia County has been a leader in responsible waste management and continues to move toward more sustainable practices in waste diversion and disposal.

Our sustainable future requires that we reduce waste generation, responsibly manage the disposal of waste, and capitalize on waste by-products.

Objectives

1. Divert 10% below 2007 levels of waste from the landfill by 2015 and 30% by 2025.

Implementing Actions

- Increase recycling of yard waste and other organic materials in the community.
    - Increase curbside yard waste collection practices to implement composting project (eliminate plastic bags).
    - Support/adopt legislation supporting additional recycling.
    - Educate the public regarding the benefits of organic material composting.
    - Promote education for recycling.
    - Provide waste audits for commercial businesses.
    - Develop partnerships with businesses (point of sale education).
    - Create partnerships with cities and local businesses for amnesty days.
    - Identify a bio-mass vendor for disaster debris andor recycled mulch.
    - Advocate for recycling credits for asphalt/concrete/mulch as a landfill cover.
    - Incentivize possible partnerships for recycling with the business community.
    - Create a solid waste management and recycling task force of private employers and the public.

How Does Solid Waste Disposal Contribute to Greenhouse Gas Emissions?

The garbage picked up from our homes and businesses is brought to a landfill. There, the organic matter in the garbage breaks down and releases a combination of gasses, including methane. Methane is a greenhouse gas, which is twenty times more potent than carbon dioxide.

Unchecked, methane is a large GHG contributor, however, it can be harnessed and put to good use. To release the methane, landfill gas wells are drilled into a landfill. Then pipes from each well carry the gas to a central point where it is filtered and cleaned before burning. This process taps one of society's least desirable items, garbage, and turns it into a useful alternative energy source.

- Encourage practices that re-use products within the community.
    - Work with Economic Development to recruit companies that use recycled materials in their production processes.
    - Work with state and regional entities on the creation of additional markets for recycled materials.
    - Educate the public regarding the benefits of organic material composting.
- Decrease waste produced by county operations.
    - Establish green purchasing guidelines within the county, requiring the purchase of products which use less packaging.
    - Enforce recycling collection at county facilities and events (i.e., leading by example). Use events as educational opportunities and educate staff on the benefits of the recycling on waste reduction.

- Minimize the amount of waste produced in the community.
    - Distribute information to businesses on waste-reducing purchasing policies.
    - Educate consumers about product life-cycles, and encourage them to make purchases that provide long term benefits.
    - Work with Economic Development to link industrial and commercial businesses to close the waste loop, by developing markets for by-products or identifying users for waste materials.
- Offer waste audits to commercial entities and the hotel/motel industry to help them find ways to reduce waste.

2. Maximize revenue and minimize operational cost from waste management services.

Implementing Actions

- Capture all household waste generated in Volusia County through the implementation of inter-local agreements with Volusia County municipalities.
- Routinely monitor operations and maintenance costs for additional savings.

3. Use waste resources to create alternative energy at the landfill.

Implementing Actions

- Expand methane-to-energy generation at the landfill.
- Identify a pilot project for location of solar/wind electricity generation at the Tomoka Landfill.





In one day, the average person creates about 4.7 lbs of waste. Recycling provides us with a means to use that waste by turning it into something new, allowing us to further preserve the natural resources that would have been otherwise used to create those products.







Sustainability Summary

The objectives and implementing actions outlined in this chapter cover a wide range of issues and sectors of our community. While they are presented in one of the seven discrete goals of the SAP, oftentimes there are multiple benefits to an individual objective. **Table 2.1** lists each objective and demonstrates the sustainability benefits it provides. Those objectives that have a measurable GHG reduction benefit are indicated by a check in the GHG column of the table. The GHG reduction objectives are further explored and quantified in Chapter 3 to guide county decisions regarding future implementation.

Table 2.1 – SAP Objectives and Sustainability Benefits

Goals + Objectives			GHG Reductions	Sustainability Benefits: Create + Retain Local Jobs	Increase Property Values	Protect and Enhance Air, Water + Natural Systems	Encourage Healthier Resident Lifestyles	Save Money	Promote Regional Sustainability + Leadership	Reduce Local Contribution to Climate + Sea Level Rise
Provide a Healthy Economy	1	Develop a vision through consensus to promote, maintain, grow, and attract businesses.		X	X			X	X	X
	2	Promote a broad range of jobs for all age groups and skill types.		X	X				X	
	3	Provide community amenities, such as recreational, entertainment, and cultural experiences, which enhance the quality of life in Volusia County and attract and retain businesses.				X	X			
	4	Retain viable commercial agricultural operations in Volusia County.		X			X		X	X
	5	Encourage low-carbon, and/or clean/green technology, businesses, and industry.		X		X			X	X
	6	Expand (or support) our tourism and trade industries.		X	X	X			X	X
Maintain a Healthy Environment	1	Continue to cultivate a culture of natural resource protection to ensure that our residents, businesses, and visitors recognize the importance of clean water, clean air, and diverse, healthy ecosystems.			X	X	X		X	X
	2	Expand, protect, and restore publicly-owned natural lands.			X	X	X		X	X
	3	Incentivize the protection of natural areas on private lands, including agriculture.	✔	X	X	X	X		X	X
	4	Manage and protect ground water and surface water bodies.			X	X	X		X	
	5	Plan for adaptation to sea level rise and dynamic climate conditions.				X		X	X	X
Promote a Healthy Community	1	Create a culture that promotes sustainable and healthy lifestyles.			X		X		X	X
	2	Facilitate discussion and collaboration to improve awareness of preventive care and wellness.					X	X		
	3	Support and incentivize local food production and distribution.		X		X		X	X	X
	4	Promote ways to engage the community and market our public community assets (e.g., parks, greenways, blueways) to promote healthy outdoor activities.			X	X	X		X	X
	5	Protect and promote an urban tree canopy that improves air quality.	✔			X	X		X	X
	6	Design and enhance trail infrastructure that promotes and supports connectivity to community amenities and commercial enterprises.		X	X	X	X		X	X
	7	Minimize the environmental impact of development within the county through sustainable building practices.			X	X	X	X	X	X
Reduce Waste and Promote Recycling	1	Divert 10% below 2007 levels of waste from the landfill by 2015 and 30% by 2025.	✔	X		X		X	X	X
	2	Maximize revenue and minimize operational cost from waste management services.				X		X		
	3	Use waste resources to create alternative energy at the landfill.	✔			X		X	X	X

Sustainability Benefits Key

- Create + Retain Local Jobs
- Increase Property Values
- Protect and Enhance Air, Water + Natural Systems
- Encourage Healthier Resident Lifestyles
- Save Money
- Promote Regional Sustainability + Leadership
- Reduce Local Contribution to Climate + Sea Level Rise

Sustainability Benefits

Goals + Objectives

Goal	#	Objective	GHG Reductions							
Encourage Efficient Transportation and Community Design	1	Create a culture of planning and designing our communities and transportation systems to encourage alternative forms of transportation.			X	X	X	X	X	X
	2	Reduce vehicle miles traveled for county business and for county employee commuting.	✔			X		X	X	X
	3	Promote opportunities and incentives for other employers in Volusia County to reduce vehicle miles traveled for employee				X		X	X	X
	4	Encourage land use design that reduces vehicle miles driven and automobile dependence.	✔			X	X	X	X	X
	5	Encourage and implement transit infrastructure improvements, increased choice ridership, and alternative transportation opportunities.	✔			X	X	X	X	X
Conserve Water and Promote Water Efficiency	1	Create a culture of examining water use holistically, with an overall strategy for potable water, alternative water sources, use of grey water, rainwater, and stormwater.				X			X	X
	2	Improve indoor water efficiency and conservation in county operations, and the treatment and delivery of water through the county's utilities.	✔			X		X	X	X
	3	Improve outdoor water efficiency and conservation in county operations.	✔			X		X		X
	4	Promote indoor water efficiency and conservation in the community.	✔			X		X	X	X
	5	Promote outdoor water efficiency and conservation in the community.	✔			X		X	X	X
	6	Develop outreach and education programs to promote the importance of our water resources.				X	X	X	X	X
	7	Develop policies to ensure sustained recharge of the Floridian aquifer and the availability of stormwater for public use.				X		X	X	X
Conserve Energy and Promote Renewable Energy	1	Create a culture of energy efficiency and conservation that encourages the use of alternative energy sources.				X		X	X	X
	2	Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 levels by 2025.	✔			X		X	X	X
	3	Improve energy efficiency and conservation of public realm lighting, which includes streetlights, pedestrian pathway lights, area lighting for parks and parking lots, and outdoor lighting around public buildings.	✔			X		X	X	X
	4	Ensure that 10% of the county's utility consumption is from renewable sources by 2015, 20% by 2025.	✔			X			X	X
	5	Reduce the amount of petroleum-based fuels used in County vehicles by 30% by 2015 and an additional 15% by 2025.	✔			X			X	X
	6	Promote energy efficiency and conservation in existing commercial and residential buildings with a target of 10% reduction in energy usage from 2007 levels by 2015, and 15% by 2025.	✔	X		X		X	X	X
	7	Improve energy efficiency and conservation in new private buildings, with a target of 20 % of new construction built to ENERGY STAR standards.	✔			X	X	X	X	X
	8	Promote the development and use of alternative energy sources in the community.	✔			X	X	X	X	X
	9	Promote the use of alternative fuels community wide.	✔			X			X	X

Chapter 3
Sustainability Targets and Implementation Framework

As stated in Chapter 1, higher bicycle and pedestrian mode shares, reduced energy and water consumption, and reduced waste generation in the community are important indicators of a sustainable future. These indicators are also important aspects of a comprehensive approach to community-wide (GHG) emission reductions, and are a proxy measure for community-wide sustainability. Chapter 2 described the county's objectives and implementing actions for seven sustainability goals. These local actions would result in GHG emission reductions that contribute to the county's reduction target. State and federal actions will contribute additional reductions. This chapter presents the emissions reductions associated with those objectives for which a quantifiable methodology is available, as well as for state and federal actions.

Emissions Reductions

The county has estimated emissions reductions that can be expected from implementation of SAP objectives and implementing actions. Not every objective is quantifiable, even if a particular action contributes to emission reductions. Therefore, **Table 3.1** provides a conservative estimate of emissions reductions toward achieving the county's targets.

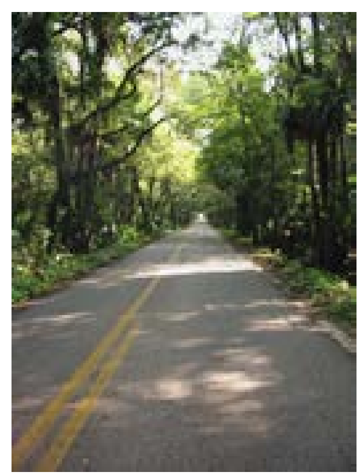
Local actions (i.e., objectives included in the SAP, but excluding State and federal actions) are estimated to provide community-wide emission reductions of 234,288 metric tons of carbon dioxide equivalent emissions per year (MT CO_2e/yr). Approximately 23,000 MT CO_2e/yr of those reductions are attributed to government operations.

In addition to local actions, state and federal actions also contribute to emissions reductions through implementation of various laws and regulatory standards. State and federal actions described in Chapter 1 will contribute an estimated 1,072,053 MT CO_2e/yr in additional emission reductions, for a total reduction of 1,306,341 MT CO_2e/yr. These reductions and their associated sustainability performance metrics are described in the following sections.









Sustainability Performance Metrics

In addition to sustainability benefits identified in Chapter 2, implementation of sustainability goals results in additional benefits, referred to as performance metrics, which are quantifiable using existing methodologies. These include new trees planted, reduced electricity and natural gas consumption, reduced vehicle miles traveled (VMT), fuel and water saved, waste diverted, electricity generated, and carbon sequestered. **Figure 3.1** provides an overview of the quantifiable performance metrics anticipated by 2025 with implementation of the SAP.

Figure 3.1 – Estimated Community-wide Sustainability Performance Metrics by 2025

Electricity Saved/Generated:
140,187,766 kWh/yr saved
49,646,389 kWh/yr generated

VMT* Reduced:
12,596,750 mile/yr
*vehicle miles traveled

GHG Reductions:
233,941 MT CO_2e/yr

CO_2 Sequestered:
367 MT CO_2e/yr

Trees Planted:
17,500 (2009-2025)

Water Saved:
5,816 million gallons/yr

Acres Restored:
379 acres (2010-2025)

Waste Diverted:
200,266 tons/yr

Natural Gas Saved:
2,116,706 therms/yr

Fuel Saved:
655,438 gallons/yr

Performance Metrics Tables

A performance metrics table accompanies the description of each sustainability goal to provide a snapshot of the quantifiable benefits provided through implementation of each goal. The tables include the county operations and community objectives text for those objectives with quantifiable results. The GHG reductions (or carbon sequestration) associated with each objective are provided, as are the other relevant performance metrics as shown in **Figure 3.1**. Each goal's overall contribution towards GHG reductions is also provided.

How to Read Sustainability Performance Metrics Tables

Sustainability Goal

Conserve Energy and Promote Renewable Energy

The county's energy conservation and renewable energy goals represent the largest source of emission reductions. Acheiving these goals would reduce GHG emissions by nearly 160,000 MT CO_2e/yr, representing 68% percent of overall reductions from local actions. Objectives under this goal would reduce emissions from county operations by 21,687 MT CO_2e/yr and reduce communitywide emissions by 136,993 MT CO_2e/yr. When fully implemented, this goal would also reduce electricity consumption by approximately 140 million kWh/yr, would generate nearly 44 million kWh/yr, and would reduce natural gas consumption by over 2 million therms/yr.

Figure 3.6 illustrates sustainability performance metrics anticipated from implementing the following quantified objectives under the *Conserve Energy and Promote Renewable Energy goal*:

Figure 3.6 – Energy Conservation and Renewable Energy Performance Metrics

Performance Categories

Objective number and text for those Objectives that have a measureable impact

#	Objective	GHG Reductions (MT CO_2e/yr)	Electricity Saved/ Generated (kWh/yr)	Natural Gas Reduced (therms/yr)
	County Operations Objectives			
1	Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 levels by 2025.	2,611	4,136,872	58,579
3	Improve energy efficiency and conservation of public realm lighting, which includes streetlights, pedestrian pathway lights, area lighting for parks and parking lots, and outdoor lighting around public buildings.	750	1,573,369	
4	Ensure that 10% of the county's utility consumption is from renewable sources by 2015, 20% by 2025.	14,251	25,635,986	
5	Reduce the amount of petroleum-based fuels used in County vehicles by 15% by 2015 and by 30% by 2025.	4,075		
	Subtotal	21,687	31,346,227	58,579
	Community Objectives			
6	Promote energy efficiency and conservation in existing commercial and residential buildings with a target of 10% reduction in energy usage from 2007 levels by 2015, and 15% by 2025.	53,798	90,744,836	603,944
7	Improve energy efficiency and conservation in new private buildings, with a target of 20 % of new construction built to ENERGY STAR standards.	10,467	18,096,703	76,690
8	Promote the development and use of alternative energy sources in the community.	31,735	43,946,389*	1,377,493
9	Promote the use of alternative fuels communitywide.	40,993		
	Subtotal	136,993	152,787,928	2,058,127
	TOTAL	158,680	184,134,155	2,116,706

* Objective 8 generates electricity while the remainder of the Energy objectives reduce energy use.

Contribution Towards Total Local Action GHG Reductions: 68%

Percentage of Total Reduction

603,944

Estimated reduction in electricity, natural gas, fuel, water, etc.

Total projected reductions in electricity, natural gas, fuel, water, etc.

Table 3.1 – Projected Greenhouse Gas Emission Reductions by 2025 with SAP Implementation

Measures and Objectives		2025 (MT CO_2e/year)
Healthy Environment		
Community Objectives		
Objective 3	Natural area protection	297
Subtotal Healthy Environment		**297**
Healthy Community		
Community Objectives		
Objective 5	Urban forest	70
Subtotal Healthy Community		**70**
Transportation and Community Design		
County Operations Objectives		
Objective 2	Vehicle miles traveled reduction	1,138
Community Objectives		
Objective 4	Land use	226
Objective 5	Alternative transportation modes	4,746
Subtotal Transportation and Community Design		**6,110**
Water Conservation and Water Efficiency		
County Operations Objectives		
Objective 2	Indoor water efficiency/conservation	105
Objective 3	Outdoor water efficiency/conservation	86
Community Objectives		
Objective 4	Indoor water efficiency/conservation	7,889
Objective 5	Outdoor water efficiency/conservation	2,921
Subtotal Water Conservation and Water Efficiency		**11,001**
Energy		
County Operations Objectives		
Objective 2	Energy efficiency/conservation in existing county buildings	2,611
Objective 3	Energy efficiency/conservation in existing county public realm lighting	750
Objective 4	County renewable electricity consumption	14,251
Objective 5	Reductions in petroleum-based fuels in county vehicle fleet	4,075
Community Objectives		
Objective 6	Energy efficiency/conservation in existing commercial and residential buildings	53,798
Objective 7	Energy efficiency/conservation in new commercial and residential buildings	10,467
Objective 8	Development and use of renewable energy sources in the community	31,735
Objective 9	Use of alternative fuels	40,993
Subtotal Energy		**158,660**
Waste		
Community Objectives		
Objective 1	Waste diversion	26,463
Objective 3	Landfill biogas-to-energy	31,687
Subtotal Waste		**58,150**
SUBTOTAL LOCAL ACTIONS		**234,288**
State and Federal Actions		
Passenger vehicle and light-duty truck fuel efficiency standards (current CAFE standards)		469,019
Renewable energy portfolio standard (20% by 2020) *This provision was repealed in the 2012 legislative session but after this plan was drafted.		603,034
SUBTOTAL STATE AND FEDERAL ACTIONS		**1,072,053**
TOTAL REDUCTIONS IN 2025		**1,306,341**

Maintain a Healthy Environment

Achieving the healthy environment goal would reduce communitywide emissions by approximately 300 MT CO_2e/yr. Performance metrics offered by this goal include sequestering carbon in natural landscapes and restoring previously disturbed landscapes to a more natural state. Although less than 1% of overall reductions from local actions are attributed to this goal, its performance metrics are of great value to the community.

Figure 3.2 illustrates sustainability performance metrics anticipated from implementing the following quantified objective under the *Maintain a Healthy Environment goal*:

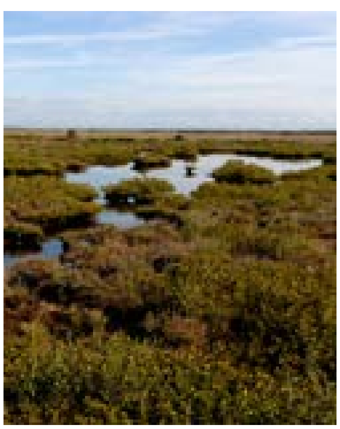
Figure 3.2 – Healthy Environment Performance Metrics

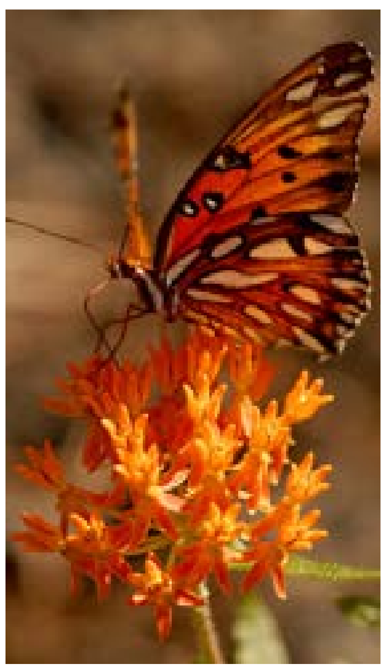
3 Community Objectives	CO_2 Sequestered: (MT CO_2e/yr)	Acres Restored: (2010-2025)
Incentivize the protection of natural areas on private lands, including agriculture.	297	379
TOTAL	297	379

Contribution Towards Total Local Action GHG Reductions

0.1%







Promote a Healthy Community

Achieving the healthy community goal would reduce community-wide emissions by sequestering 70 MT CO_2e/year. Although this goal accounts for less than 1% of overall reductions from local actions, it provides a valuable community benefit in the form of an enhanced tree canopy that is a visual amenity and contributes to stormwater management.

Figure 3.3 illustrates sustainability performance metrics anticipated from implementing the following quantified objective under the *Promote a Healthy Community goal*:

Figure 3.3 – Healthy Community Performance Metrics

5 Community Objectives	CO_2 Sequestered: (MT CO_2e/yr)	Trees Planted: (2009-2025)
Protect and promote an urban tree canopy that improves air quality.	70	17,500
TOTAL	70	17,500

Contribution Towards Total Local Action GHG Reductions

0.03%





Encourage Efficient Transportation and Community Design

Achieving the transportation and community design goal would reduce GHG emissions by 6,110 MT CO_2e/yr, accounting for 3% of overall reductions from local actions. Objectives under this goal would reduce emissions from county operations by 1,138 MT CO_2e/yr, and would reduce community-wide emissions by 4,972 MT CO_2e/yr. This goal also reduces vehicle miles traveled and fuel consumption.

Figure 3.4 illustrates sustainability performance metrics anticipated from implementing the following quantified objectives under the *Encourage Efficient Transportation and Community Design goal*:

Figure 3.4 – Efficient Transportation and Community Design Performance Metrics



	Objective	GHG Reductions (MT CO_2e/yr)	VMT* Reduced (miles/yr)	Fuel Saved (gallons/yr)
	County Operations Objectives			
2	Reduce vehicle miles traveled for county business and for county employee commuting.	1,138	2,198,243	117,239
	Subtotal	1,138	2,198,243	117,239
	Community Objectives			
4	Encourage land use design that reduces vehicle miles driven and automobile dependence.	226	471,844	24,421
5	Encourage and implement transit infrastructure improvements, increased choice ridership, and alternative transportation opportunities.	4,746	9,926,663	513,778
	Subtotal	4,972	10,398,507	538,199
	TOTAL	6,110	12,596,750	655,438

*VMT= vehicle miles traveled

Contribution Towards Total Local Action GHG Reductions

3%







Conserve Water and Promote Water Efficiency

Achieving the water conservation and efficiency goal would reduce GHG emissions by approximately 11,000 MT CO_2e/yr, representing 5% of overall reductions from local actions. Objectives under this goal would reduce emissions from county operations by 191 MT CO_2e/yr, and would reduce community-wide emissions by 10,810 MT CO_2e/yr. This goal also reduces water consumption – an important sustainability metric as access to clean, potable water becomes scarcer in the future.

Figure 3.5 illustrates sustainability performance metrics anticipated from implementing the following quantified objectives under the *Conserve Water and Promote Water Efficiency goal*:

Figure 3.5 – Water Conservation and Efficiency Performance Metrics

	County Operations Objectives	GHG Reductions (MT CO_2e/yr)	Water Saved (million gallons/yr)
2	Improve indoor water efficiency and conservation in county operations, and the treatment and delivery of water through the county's utilities.	105	45
3	Improve outdoor water efficiency and conservation in county operations.	86	68
	Subtotal	191	113

	Community Objectives	GHG Reductions (MT CO_2e/yr)	Water Saved (million gallons/yr)
4	Promote indoor water efficiency and conservation in the community.	7,889	3,392
5	Promote outdoor water efficiency and conservation in the community.	2,921	2,311
	Subtotal	10,810	5,703
	TOTAL	11,001	5,816

Contribution Towards Total Local Action GHG Reductions

5%



Conserve Energy and Promote Renewable Energy

The county's energy conservation and renewable energy goals represent the largest source of emission reductions. Acheiving these goals would reduce GHG emissions by nearly 160,000 MT CO_2e/yr, representing 68% percent of overall reductions from local actions. Objectives under this goal would reduce emissions from county operations by 21,687 MT CO_2e/yr and reduce community-wide emissions by 136,993 MT CO_2e/yr. When fully implemented, this goal would also reduce electricity consumption by approximately 140 million kWh/yr, would generate nearly 44 million kWh/yr, and would reduce natural gas consumption by over 2 million therms/yr.

Figure 3.6 illustrates sustainability performance metrics anticipated from implementing the following quantified objectives under the *Conserve Energy and Promote Renewable Energy goal*:

Figure 3.6 – Energy Conservation and Renewable Energy Performance Metrics

#	Objective	GHG Reductions ($MT CO_2e/yr$)	Electricity Saved/ Generated (kWh/yr)	Natural Gas Reduced (therms/yr)
	County Operations Objectives			
2	Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 levels by 2025.	2,611	4,136,872	58,579
3	Improve energy efficiency and conservation of public realm lighting, which includes streetlights, pedestrian pathway lights, area lighting for parks and parking lots, and outdoor lighting around public buildings.	750	1,573,369	
4	Ensure that 10% of the county's utility consumption is from renewable sources by 2015, 20% by 2025.	14,251	25,635,986	
5	Reduce the amount of petroleum-based fuels used in County vehicles by 15% by 2015 and by 30% by 2025.	4,075		
	Subtotal	21,687	31,346,227	58,579
	Community Objectives			
6	Promote energy efficiency and conservation in existing commercial and residential buildings with a target of 10% reduction in energy usage from 2007 levels by 2015, and 15% by 2025.	53,798	90,744,836	603,944
7	Improve energy efficiency and conservation in new private buildings, with a target of 20 % of new construction built to ENERGY STAR standards.	10,467	18,096,703	76,690
8	Promote the development and use of alternative energy sources in the community.	31,735	43,946,389*	1,377,493
9	Promote the use of alternative fuels communitywide.	40,993		
	Subtotal	136,993	152,787,928	2,058,127
	TOTAL	158,680	184,134,155	2,116,706

* Objective 8 generates electricity while the remainder of the Energy objectives reduce energy use.

Contribution Towards Total Local Action GHG Reductions 68%

Reduce Waste and Promote Recycling

Achieving the waste reduction and recycling goal would reduce community-wide emisisons by approximately 58,000 MT CO_2e/yr, representing 25% of overall reductions from local actions. Achieving this goal would also divert 200,266 tons of waste per year from the landfill, while generating 5.7 million kWh/year of electricity from landfill gas capture.

Figure 3.7 illustrates sustainability performance metrics anticipated from implementing the following quantified objectives under the *Reduce Waste and Promote Recycling goal*:

Figure 3.7 – Waste Reduction and Recycling Performance Metrics

	Community Objectives	GHG Reductions (MT CO_2e/yr)	Waste Diverted (tons/yr)	Electricity Saved/ Generated (kWh/yr)
1	Divert 10% below 2007 levels of waste from the landfill by 2015 and 30% by 2025.	26,463	200,266	
3	Use waste resources to create alternative energy at the landfill.	31,687		5,700,000
	TOTAL	58,150	200,266	5,700,000

Contribution Towards Total Local Action GHG Reductions

25%



State and Federal Reductions

To meet its goals, the county will consider both the effect of local actions (described in Chapter 2), and the effect of state and federal policies and regulations (described in Chapter 1). As shown in **Table 3.1**, implementation of state and federal actions at the community-wide level would result in estimated emissions reductions of 1,072,053 MT CO_2e/yr, representing 82% of overall community-wide reductions.

The largest anticipated reductions are from Florida's renewable portfolio standard, which requires utilities to obtain 20% of their electricity from renewable energy sources by 2020. Though this requirement was removed from energy policy approved by the Florida Legislature in 2012, there is still legislative support for "a stable, reliable, and diverse supply of energy" (quote taken from the 8/16/12 edition of the Florida Current, attributed to Agriculture Commissioner Adam Putnam's comments at the 2012 Florida Energy Summit). Analyses in this SAP assume that reductions in emissions occur as a result of an increased renewable energy contribution. Energy policies appear to be an active part of state legislative considerations in the near future, and this projected reduction in emissions may need to be modified if renewable energy is not a significant component of Florida's approach going forward.

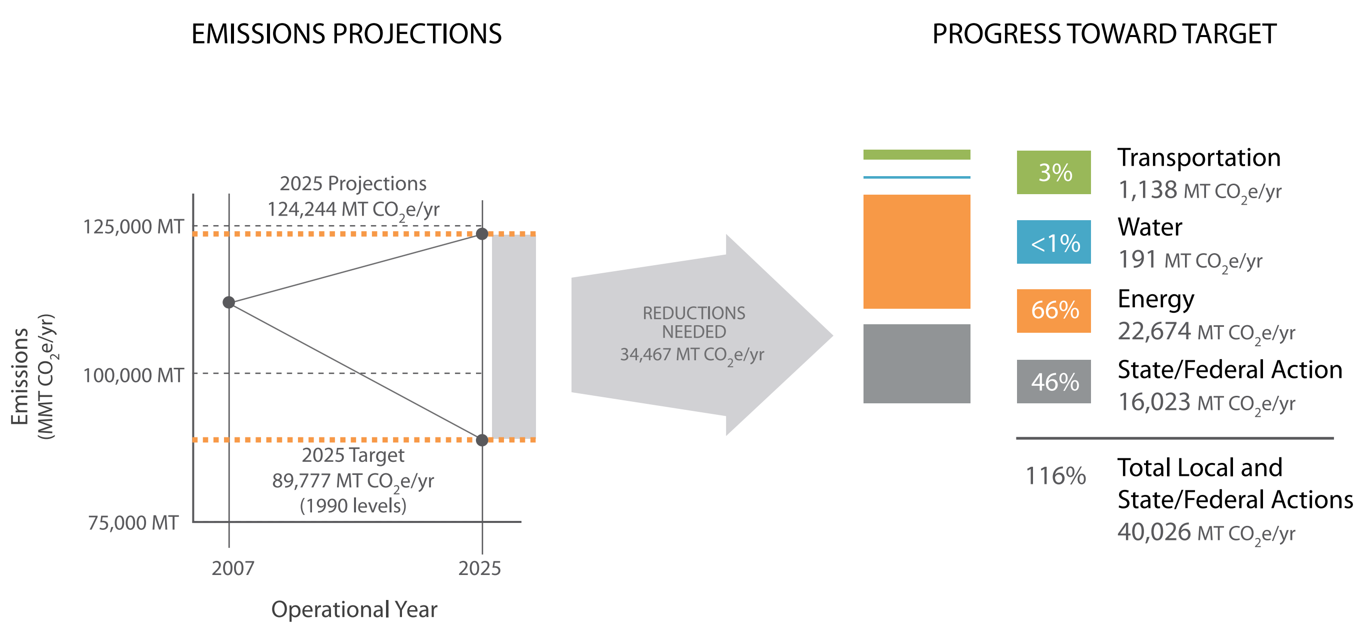
Federal fuel efficiency improvements to passenger vehicles and light-duty trucks would provide an additional estimated reduction of 469,019 MT CO_2e/yr. As residents and businesses replace older vehicles with newer ones, people will consume less fuel and create fewer emissions per vehicle mile traveled.

Progress Toward Reduction Target

County Operations

Local actions described in the SAP and estimated reductions from state and federal actions would enable the county to achieve its county operations target. As shown in **Figure 3.8**, the target requires reductions of 34,467 MT CO_2e/year. Local actions would reduce county operation GHG emissions by 23,016 MT CO2e/yr. State and federal actions would reduce county operation GHG emissions by an additional 16,023 MT CO_2e/yr, for a total reduction of 39,039 MT CO_2e/yr. This is approximately 5% below 1990 levels; exceeding the county's target.

Figure 3.8 – Progress toward County Operations Target

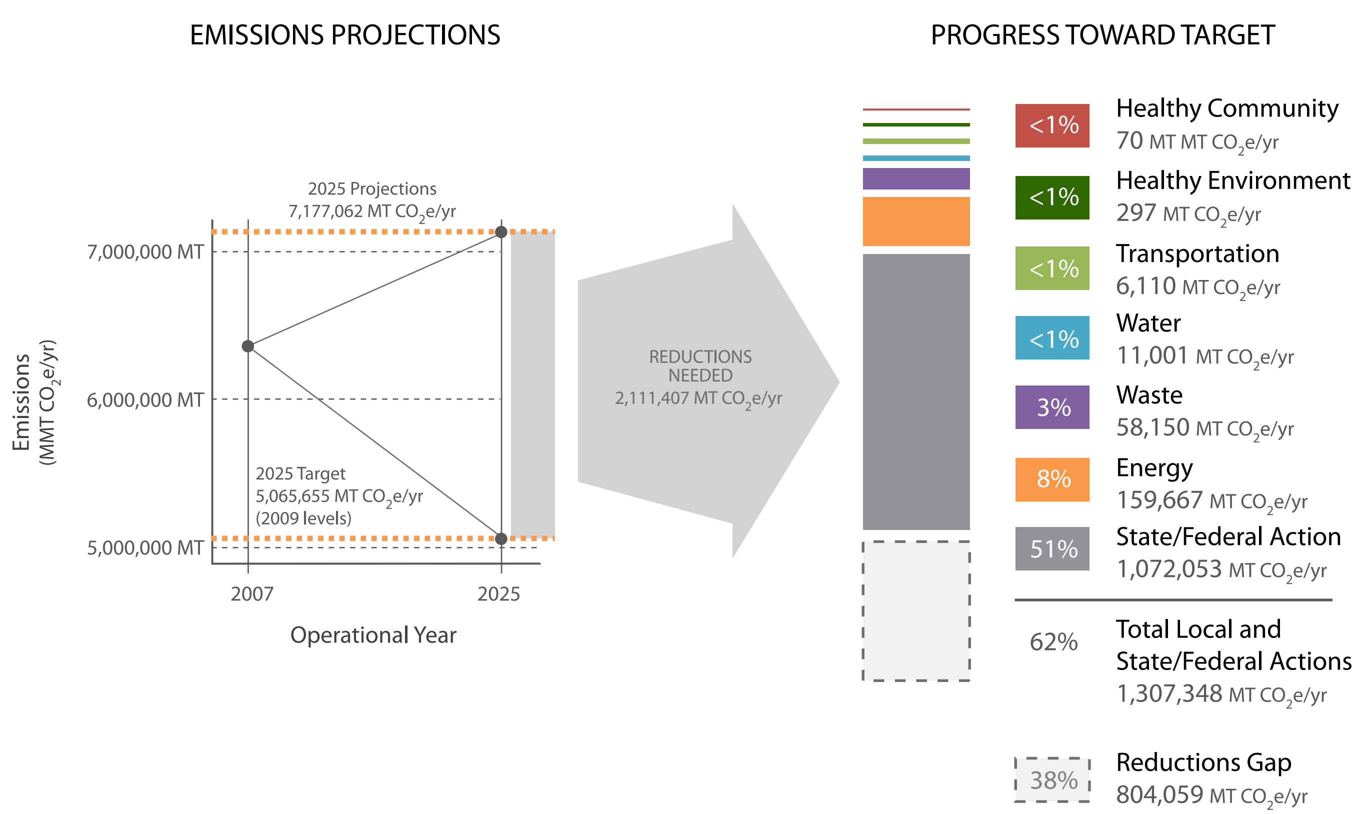


Community-wide Emissions

Local actions described in the SAP and estimated reductions from State and federal actions would reduce GHG emissions by 1,306,341 MT CO_2e/yr in 2025. As stated in Chapter 1, because the community-wide emissions were calculated using a top-down approach, the actual emissions are not known. Therefore, the reductions cannot provide an exact measure of the progress towards the community-wide reduction target. Using the community-wide emissions inventory provided by the top-down approach, the local and statewide actions described in this SAP would fall short of the community-wide reduction target by 805,066 MT CO_2e/yr (see **Figure 3.9**), or approximately 38%.

To address this reduction gap, the county will work towards a bottom-up inventory, so the SAP's reductions can accurately be measured against the target. This could result in a lower emissions inventory, and therefore, fewer reductions needed to achieve the target. The county could then develop additional objectives and implementing actions or increase participation rates beyond those estimated in this SAP to augment community-wide reductions. Over time, the county also anticipates that as climate change research continues to emerge, methodologies will be developed enabling quantification of additional SAP objectives actions.

Figure 3.9 – Progress toward Community-wide Target



Moving Foward

An understanding of the financial implications of the plan's actions is essential for the county to move forward with implementation. In particular, assessing costs in combination with an objective's benefits (presented throughout this chapter) will help the county prioritize future actions. Objectives with a low cost and a high GHG reduction capacity (or other sustainability benefits) should be considered first.

Volusia County also understands that while a proposed action may be financially infeasible today, there may be a time in the future when changes in electricity or fuel prices alter the economic reality of a strategy. With this in mind, the actions and objectives in this plan will be re-assessed regularly. The county will also look for funding sources (such as state and federal grants) to reduce implementation costs.

Community Objectives

The financial cost associated with implementing the community objectives is described as Simple Cost to the county, based on the calculated average annual cost to the county. The costs of these objectives are categorized according to the following scale:

Icon	Simple Cost Range (estimated annual costs to the county)
$	**Very Low:** Less than $25,000
$$	**Low:** $25,000-49,999
$$$	**Medium-Low:** $50,000-99,999
$$$$	**Medium:** $100,000-249,999
$$$$$	**Medium-High:** $250,000-499,999
$$$$$$	**High:** Greater than $500,000

The simple cost calculations were based on estimates of county staff time needed for implementation and a reasonable range of material (non-labor) costs of the proposed actions, such as the typical cost of outreach campaigns, tree planting or rebate programs.

Determining detailed costs for Community Objectives is very difficult during the planning stage. Many of the actions involve creating new educational resources and incentive programs, starting new partnerships, or enacting new policies; the full costs of these actions will be evaluated after implementation responsibilities are assigned and program details are developed.

Table 3.2 provides the simple cost to the county for each Community Objective evaluated. This information will help guide the county's implementation schedule. Low cost items will be prioritized for the short-term; higher cost items will likely have a longer-term schedule or may be phased to spread the costs over time. For example, the high estimated cost of Objective 5 is based upon a very conservative assumption that the transit infrastructure improvements are to be integrated into a regional transportation sustainability strategy. In order to quantify the benefits of this strategy, the county has assumed that this objective would include construction of complete streets (e.g., roads that provide space for pedestrians, cyclists, and motorists), and will be implemented as new roads are constructed in the county or as planned major roadway reconstruction occurs. In this way, the objective would largely be achieved through the county's normal operating procedures. The cost should not be viewed as a new county expense related to this SAP, but rather as the SAP quantifying the benefits of an action the county would have already undertaken on its own.

Table 3.2 – Simple Cost of Community Objectives

Sustainability Goals and Community Objectives	Simple Cost	Annual Cost	Total Cost 2012-2025
Healthy Environment			
Objective 3: Natural area protection	$	$12,600	$163,400
Healthy Community			
Objective 5: Urban forest	$$	$29,800	$387,000
Efficient Transportation and Community Design			
Objective 4: Land use	$	$20,200	$262,000
Objective 5: Alternative transportation modes	$$$$$$	$18,077,700	$235,010,500
Water Conservation and Water Efficiency			
Objective 4: Indoor water efficiency/ conservation	$$	$29,300	$381,500
Objective 5: Outdoor water efficiency/ conservation	$$$$	$212,600	$2,763,900
Energy Conservation and Renewable Energy			
Objective 6: Energy efficiency/conservation in existing commercial and residential buildings	$$	$25,300	$328,300
Objective 7: Energy efficiency/conservation in new commercial and residential buildings	$	$14,600	$189,500
Objective 8: Development and use of renewable energy sources in the community	$	$12,300	$160,400
Objective 9: Use of alternative fuels	$	$4,100	$53,300
Waste Reduction and Recycling			
Objective 1: Waste diversion	$$$	$85,400	$1,110,000

County Operations Objectives

A more detailed financial analysis was conducted on the County Operations Objectives to assist with immediate action prioritization. The Energy goal was of particular interest to Volusia County departments. Therefore, the county calculated the financial return on investment (FROI) and the sustainable return on investment (SROI) of a select group of actions under three Energy objectives.

The FROI calculates the amount of money gained (or lost) on an investment relative to the amount of money invested. The SROI adds non-cash variables to the FROI by including estimates of the monetary values of public benefits. Put another way, an SROI analysis uses published estimates of the monetary value of benefits that are not typically measured in dollars, but nonetheless provide real economic returns. For example, reducing the occurrence of air pollutants known to cause asthma and other health conditions provides the benefit of reduced healthcare spending.

The non-cash benefit estimates used in this SROI analysis were based on academic studies that have calculated the human health, ecological, and aesthetic degradation from air pollutant damages (mono-nitrogen oxides, sulfur oxide, and particulate matter), as well as estimates from the United States Government's Interagency Working Group on the social cost of carbon. The social cost of carbon estimates are intended to include changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to increases in carbon emissions.

Glossary of Financial Terms:

Net Present Value (NPV) – NPV compares the value of a dollar today to the value of that same dollar in the future. Projects with a negative NPV should be rejected since project cash flows would also be negative.[1]

Internal Rate of Return (IRR) – The discount rate that makes the NPV of all cash flows equal to zero. In general, the higher a project's IRR, the more profitable the project will be.

Benefit-to-Cost Ratio – Mathematically speaking, this is the ratio of the sum of a project's positive returns over time divided by the sum of the project's costs. The ratio can also be viewed as the financial return per dollar invested.

Discounted Payback Period – The amount of time it takes the sum of the discounted cash flows to equal the initial investment.

Return on Investment (ROI) –The average annual return as a percentage of the project's cost. In general, a project with a higher ROI is considered a better financial choice.

[1] A discount rate of 5% was used in all financial models.

Energy Efficiency Improvements



Objective 2. Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 levels by 2025.

One action step towards achieving the reduction is to implement energy efficient retrofits to county buildings. Using a portion of the funding from the county's Energy Efficiency Conservation Block Grant (EECBG), Volusia County is implementing a number of energy efficiency improvements to its facilities. These improvements include plumbing and lighting retrofits, chilled water system upgrades, and building envelope improvements. The capital cost of the upgrades is just over $990,000 (paid for by the EECBG, so there is no cost to the county). These improvements will save the county $100,000 annually through reduced water and electricity use. Non-cash benefits of these improvements include a reduction of over 600 metric tons of GHG per year and a reduction in multiple air pollutants, which will contribute to improved public health within the county.

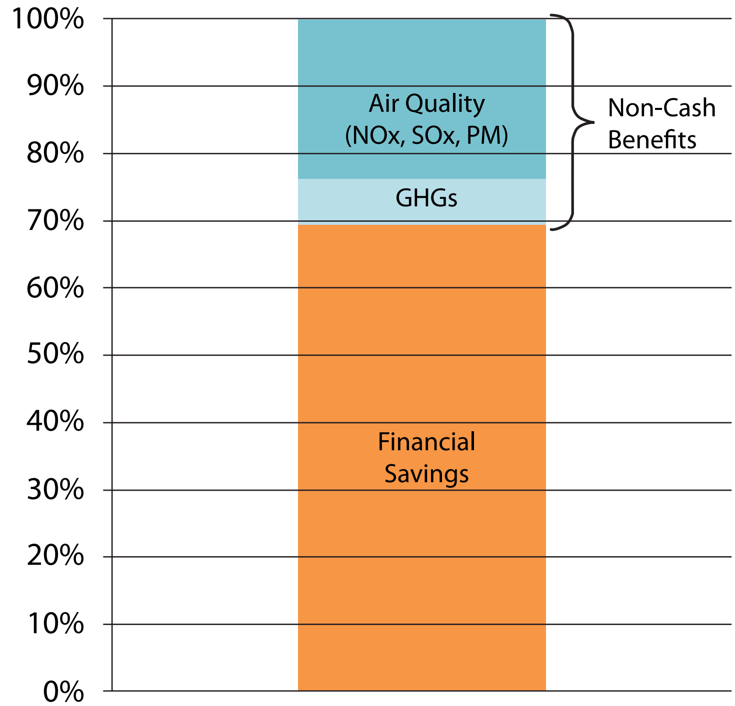
Table 3.3 shows this objective's financial return. The positive net present value indicates that the financial returns from this investment, over the duration of the SAP, are greater than the initial investment of $992,306. Additionally, since the original investment money came from the EECBG, and not from the county's general fund, the actual net present value is significantly greater than the value shown here. The internal rate of return is 7%. Similarly, the benefit-to-cost ratio shows that the total financial benefit of the investment is greater than the original cost, resulting in a benefit to cost that is greater than 1.0. The discounted payback period indicates that it would take 11 years before the financial returns would recoup the original investment (if the block grant were not available). Finally, the analysis shows that the average annual savings resulting from this investment are equal to approximately 12% of the original cost.

Figure 3.10 shows the proportion of cash to non-cash benefits anticipated between 2012 and 2025 due to the building energy efficiency improvements. Financial savings account for nearly 70% of the benefits, while reductions in GHGs and air quality improvements comprise the remaining 30% of the benefits.

Table 3.3 – FROI Summary, Energy Efficiency Improvements

Total Project Cost	$992,306
Net Present Value	$109,000
Internal Rate of Return	7%
Benefit-to-Cost Ratio	1.1
Discounted Payback Period	11
Return on Investment	12%

Figure 3.10 – SROI, Energy Efficiency Improvements



Rooftop Solar Installations

Objective 4. Ensure that 10% of the county's utility consumption is from renewable sources by 2015, 20% by 2025.

The county is interested in installing solar photovoltaic panels on the roofs of two county-owned fire stations. Using estimating tools such as the National Renewable Energy Laboratory of the U.S. Department of Energy's "In My Backyard," the county approximated the amount of electricity each roof could generate with a solar array and compared this with the energy needs of each facility.

Unfortunately, despite a rebate from Florida Power and Light, neither installation is financially viable at this time. As shown in **Tables 3.4** and **3.5**, both solar installations would result in negative net present values and internal rates of return and would have benefit-to-cost ratios of less than 1.0.

The county will continue to explore opportunities for renewable energy installations on county facilities, particularly if the price of photovoltaics declines, if electricity prices significantly rise, or if the utility companies allow for buy-back of excess power production.

Table 3.4 – FROI Summary, Fire Station #32

Total Project Cost	$109,750
Net Present Value	-$56,000
Internal Rate of Return	-5%
Benefit-to-Cost Ratio	0.5

Table 3.5 – FROI Summary, Fire Station #41

Total Project Cost	$41,500
Net Present Value	-$18,500
Internal Rate of Return	-3%
Benefit-to-Cost Ratio	0.6

County Vehicle Fleet Improvements

Objective 5. Reduce the amount of petroleum-based fuels used in county vehicles 15% by 2015 and 30% by 2025.

There are a number of available technologies and fuel options to reduce the carbon intensity of the county's fleet. To begin to move its vehicles towards its 2015 goal, the county evaluated the financial feasibility of three options: (1) compressed natural gas (CNG), (2) liquefied petroleum gas (LPG), and (3) electric vehicles.

Compressed Natural Gas

For the CNG analysis, the county used the U.S. Department of Energy's Clean Cities Vehicle and Infrastructure Cash-Flow Evaluation (VICE) model to estimate the cost to build and operate a fast-fill CNG station and run 15 CNG tractor-trailer and heavy equipment vehicles (estimated to be a $1.8 million investment and to incur operating costs of approximately $350,000 per year). Based on the current and projected price differences between CNG and diesel fuel, the county will save $530,000 in 2013, increasing to $802,000 by 2025. Also, as CNG is cleaner than diesel, the county will significantly reduce air pollutants through the use of the fuel.

As shown in **Table 3.6**, investment in CNG technology is a financially-viable option, providing a positive return on investment for the county with an eight-year payback period.

The cost savings to the county increases as the number of CNG powered vehicles increases as much of the cost is for the infrastructure. The county is exploring a public-private partnership for a CNG fueling station, which could bring the discounted payback period down to three years.

Table 3.6 – FROI Summary, Compressed Natural Gas

Total Project Cost	$1,839,195
Net Present Value	$955,000
Internal Rate of Return	13%
Benefit-to-Cost Ratio	1.2
Discounted Payback Period	8
Return on Investment	17%

Liquified Petroleum Gas



For the LPG (also known as propane) analysis, the county analyzed the financial implications of purchasing 15 new propane vehicles in lieu of 15 new unleaded gasoline vehicles. At an estimated cost difference of $4,000, purchasing propane vehicles would cost the county $60,000. Savings were based on the current and projected price difference between gasoline and LPG. Gasoline currently costs approximately $1.70 more per gallon than propane. However, the EPS Energy Information Administration estimates LPG prices to increase at 1.3% per year and gas prices to increase at 0.4% per year. Therefore, these savings are projected to decrease over time, and propane prices are projected to surpass gasoline prices by 2024. Despite this, LPG vehicles are a financially viable option for the county. This conclusion is reflected in Table 3.7, which shows a positive net present value for the investment, a benefit-to-cost ratio of 1.6, and a discounted payback period of only three years. Furthermore, if the county plans to retire the vehicles in or before 2023, the county's average annual savings resulting from this investment will increase from 14% of the original cost to 20% percent.

Table 3.7 – FROI Summary, Liquefied Petroleum Gas

Total Project Cost	$60,000
Net Present Value	$35,600
Internal Rate of Return	30%
Benefit-to-Cost Ratio	1.6
Discounted Payback Period	3
Return on Investment	14%

Electric Vehicles

For the electric vehicle analysis, the county examined the marginal cost of purchasing four new 2012 Toyota Prius hybrids and adding electric plug-in technology in lieu of four gasoline-powered light duty vehicles (2012 Ford Taurus), and the appropriate electric vehicle infrastructure to charge the cars. The marginal upfront cost of the vehicles (based on the current price difference between a Ford Taurus and a converted Toyota Prius Plug-in Hybrid, including a $5,000 Florida incentive) and the infrastructure is estimated to be $22,800. Based on the cost and use of electricity versus gasoline, the plug-in hybrid electric vehicles would save the county between $7,000 and $10,000 annually. There would also be an estimated 16 MT CO_2e saved per year and considerable improvements in air quality. These non-financial benefits would be further enhanced if the county were to use an alternative energy source to charge the vehicles rather than purchasing electricity from the grid.

As shown in **Table 3.8**, this will be the most profitable action for the county of the strategies examined. However, this strategy relies on a State incentive to reduce the cost of vehicle conversion. If the incentive is not available, the net present value is $29,850 with a discoutned payback period of eight years. If the county is unable to obtain this discount, the financial implications of this action will need to be re-examined.

As shown in **Figure 3.11**, not only do electric vehicles make sense financially for the county, they offer significant benefits regarding improvements in air quality.

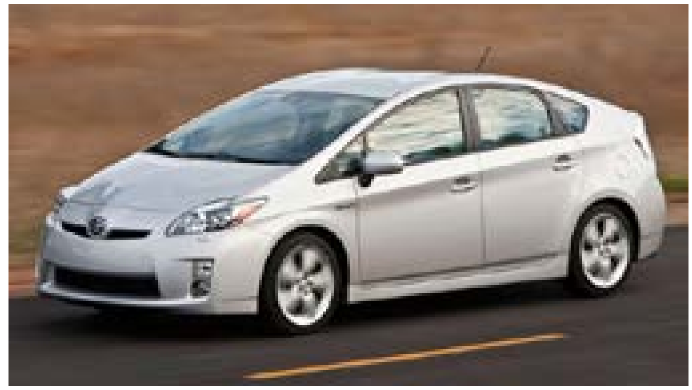


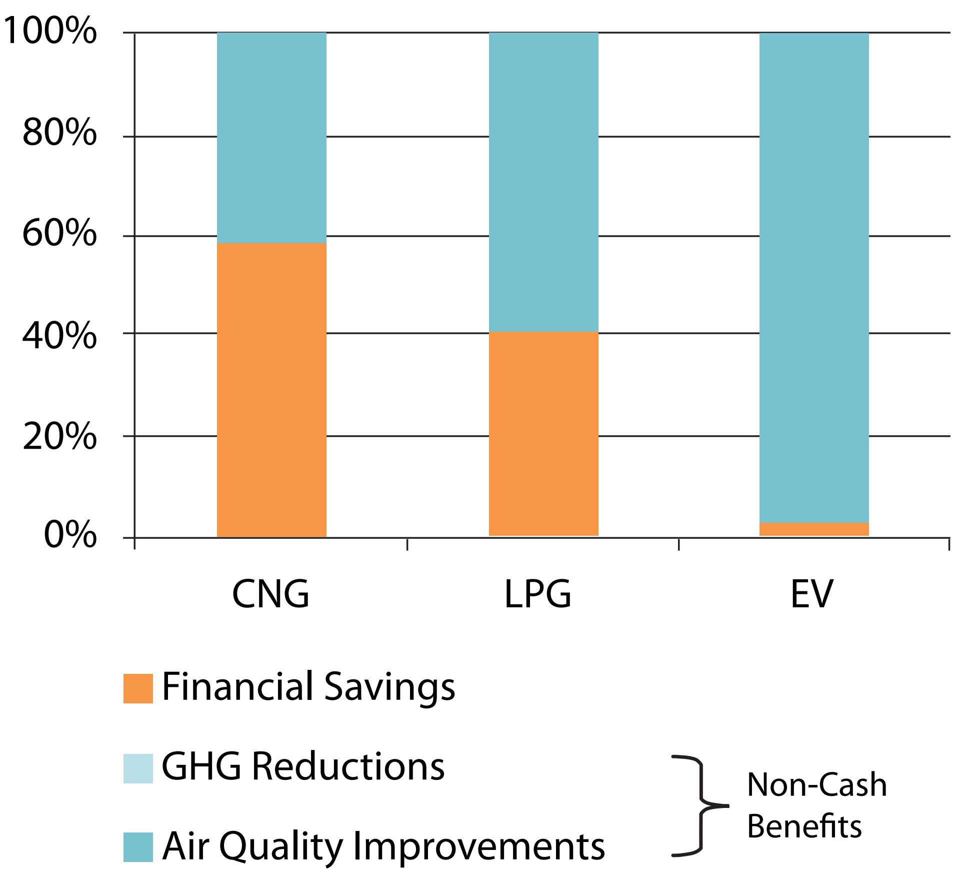


Table 3.8– FROI Summary, Electric Vehicles

Total Project Cost	$22,800
Net Present Value	$49,800
Internal Rate of Return	34%
Benefit-to-Cost Ratio	1.7
Discounted Payback Period	3
Return on Investment	38%

Figure 3.11 demonstrates the proportion of cash to non-cash benefits anticipated during the planning period (2012-2025) for each alternative vehicle technology. Monetary values were estimated for the non-cash benefits based on academic research and independent research organizations, such as the Victoria Transport Policy Institute. The majority of benefits are due to improvements in air quality. Gasoline and diesel fuels contain toxic substances that are known to cause adverse health impacts in people and are largely responsible for urban smog. Using alternative fuels could produce significant public health benefits for Volusia County residents and employees.

Figure 3.11 – SROI, County Vehicle Fleet Improvement



Chapter 4
Tracking, Measurement, and Verification



Volusia County recognizes that implementing sustainability actions will provide benefits to the county through reduced long-term operating expenses and to residents through improvements to their qualities of life (e.g., cleaner water and air, reduced utility expenses, improvements to multi-modal transportation). The SAP provides a pathway to achieve the county's sustainability goals, including GHG emissions reductions. This chapter describes how the county will implement the objectives described in Chapters 2 and 3, as well as how the SAP will be updated overtime to remain relevant and effective.

This chapter is organized into the following sections:

- Implementation: Describes how county staff will implement SAP objectives, and measure and track success.
- Plan Evaluation and Evolution: Describes procedures to evaluate, update, and amend the SAP to ensure that the plan remains relevant and effective.

Implementation

Ensuring that objectives translate from policy language into on-the-ground results is critical to the success of the SAP. To facilitate this, each sustainability goal and objective presented in Chapter 2 describes actions that are the responsibility of the county to implement. To ensure success, the county will identify who is responsible for each action, set a timeframe for implementation, and define measures or indicators to track success.

Table 4.1 provides a template for tracking implementation and performance of the objectives. The county will use this template to create a similar table for each quantified objective to track progress toward SAP targets. This sample identifies the information necessary to implement Energy Objective 2 and ensure its results relate to anticipated emissions reductions described in Chapter 3. The tracking framework should include the following information:

- Actions that identify specific, ordered steps the county will take to implement the stated objective;
- Departments or agencies responsible for each action. SAP implementation meetings should take place several times a year. Some actions require inter-departmental or inter-agency cooperation and appropriate partnerships will need to be established. A timeline indicating when each action will be implemented will be created. These timelines may be as broad as short-, medium-, and long-term or they may identify a specific target year;
- Progress indicators that enable staff, the County Council, and the public to track implementation and monitor overall SAP progress. Provide short-term (2015), interim (2020), and long-range (2025) progress indicators where possible. Short-term and interim progress indicators are especially important, as they provide mid-course checks to evaluate if an objective is on path to success. To that end, progress indicators should be developed based on the assumptions used to quantify each objective's emissions reductions; and
- Tracking mechanisms that identify progress. Not all progress indicators can be easily or accurately tracked, but the better performance is tracked the better SAP progress can be evaluated.

Table 4.1– Implementation Tracking Template

Sustainability Goal: Conserve Energy and Promote Renewable Energy

Objective 2: Improve energy efficiency and conservation in existing county buildings and reduce energy use by a minimum of 10% below 2007 levels by 2015, and a minimum of 15% below 2007 by 2025.

Financial:

	Action	Responsibility	Phasing	Finance
A	Perform building energy audits to assess performance and identify areas for energy improvements.	(e.g., Public Works Department, Planning and Development Services Department) Facilities	(e.g., Short-Term, Medium-Term, Long-Term, or specific target years) *Ongoing*	(e.g., grants, direct funding from county, partnerships) *Direct*
B	Install smart grid or smart metering technology to show exactly where and when electrical power is being used.	*Facilities, Library Services, Airport, Ocean Center, Corrections*	*Short-Term to Medium-Term*	*Direct/Grants*
C	Implement low-cost to no-cost energy efficiency measures as a preliminary first effort toward efficiency to reduce county facility energy use.	Facilities	*Short-Term*	*Direct*
D	Prioritize other energy improvements and implement as funding is available.	*Facilities, OSEM*	*Ongoing*	*Grants/Rebates*
E	Install solar thermal hot water systems in county facilities, were appropriate.	*Facilities, Corrections*	*Short-Term to Medium-Term*	*Direct*
F	Provide employees with information about saving energy in the workplace.	*Facilities, OSEM, Personnel*	Ongoing	*Direct/Partnerships*
G	Reduce energy consumption and major energy loads by cutting back on power usage at peak times (demand-side management).	Facilities	*Ongoing*	*N/A*

Year	Program Indicators	Tracking Mechanism
2015	A Perform energy audits on the tier one county facilities.	Audit analysis and Facilities Sustainability Action Plan.
	B Install smart meters on those facilities identified in the tier one energy audit process.	Smart meter Dashboard monitoring program.
	C Temperature controls for seasonal efficiency, installing automated thermostats that assure lights and HVAC systems are turned off or down when buildings are not occupied.	Smart meter Dashboard monitoring program and Energy Star Portfolio Manager.
	D Implement energy improvement projects as funding becomes available.	SAP
	E Identify appropriate facilities for solar hot water systems and begin installation for priority locations.	SAP
	F Through the *Green Volusia Program* and OSEM, work with Personnel to develop education outreach for employees about energy savings in the workplace.	SAP
	G Work with the energy providers to develop and implement a demand-side management plan.	Smart meter Dashboard monitoring program and Energy Star Portfolio Manager.

Table 4.1– Implementation Tracking Template continued

2020	A Perform energy audits on the tier two county facilities.	Audit analysis and Facilities Sustainability Action Plan.
	B Install smart meters on those facilities identified in the tier two energy audit process.	Smart meter Dashboard monitoring program.
	D Implement energy improvement projects as funding becomes available.	SAP
	E Finish installation of solar hot water systems for the remainder of the identified locations.	SAP
	F Through the Green Volusia Program and OSEM, continue working with Personnel to develop new employee education training material on energy saving.	SAP
	G Work with the energy providers to evaluate the current demand-side management plan and make revisions as needed.	Smart meter Dashboard monitoring program and Energy Star Portfolio Manager.
2025	A Perform energy audits on the tier three county facilities.	Audit analysis and Facilities Sustainability Action Plan.
	D Implement energy improvement projects as funding becomes available.	SAP
	F Through the Green Volusia Program and OSEM, continue working with Personnel to develop new employee education training material on energy saving.	SAP
	G Work with the energy providers to evaluate the current demand-side management plan and make revisions as needed.	Smart meter Dashboard monitoring program and Energy Star Portfolio Manager.

Plan Evaluation and Evolution

The SAP represents the county's best attempt to create an organized, community-wide response to the threat of climate change. County staff will evaluate the plan's performance over time, using the implementation tracking template established in **Table 4.1**, and recommend alterations or amendments if the SAP is not achieving the stated objectives and emissions reduction targets.

Plan Evaluation

Two types of performance evaluation are important: evaluation of the SAP as a whole and evaluation of the individual component objectives. Community-wide GHG emission inventories will provide the best indication of SAP effectiveness, although it will be important to reconcile actual growth in the county versus the growth projected when the SAP was developed. Conducting these inventories periodically will enable direct comparison to the 2007 government operations baseline inventory and will demonstrate the SAP's ability to achieve the adopted reduction target. As previously stated, future community-wide inventories cannot be directly compared to the 2007 inventory presented in this SAP because it was created using a top-down approach. As actual community data becomes available, sectors of the community-wide inventory will be analyzed through the bottom-up approach. The county will endeavor to coordinate community-wide inventories in 2015, 2020, and 2025 to assess the level of GHG emission reductions.

While community-wide inventories provide information about overall GHG reductions, it is also important to understand how well each objective is being met. Evaluating the emissions reduction capacity of individual objectives will improve staff and decision makers' abilities to manage and implement the SAP. The county can promote successful objectives and reevaluate or replace those found to be under-performing. Evaluating performance of each objective requires data describing actual community participation rates and measurements of GHG reduction capacity. The tracking mechanism identified for each objective identifies the data required and how it should be collected.



The county will coordinate evaluation of each SAP objective on the same schedule established for community-wide inventories, and summarize progress toward SAP objectives and targets in a report that describes:

- Sustainability accomplished and estimated annual GHG reductions to date (i.e., since adoption of the SAP);
- Achievement of progress indicators;
- Participation rates (where applicable); and
- Remaining barriers to implementation.

Plan Evolution

For the SAP to remain relevant, the county must also adapt and transform the plan over time. It is likely that new information about climate change science and risk will emerge, new GHG reduction technologies and innovative municipal strategies will be developed, new financing will be available, and state and federal legislation will change. It is also possible that community-wide inventories will indicate that the community is not achieving anticipated sustainability goals and emissions reduction targets. As part of the evaluations identified above, the county will assess the implications of new scientific findings and technology, explore new sustainability opportunities, respond to changes in state and federal policy, and incorporate these changes in future updates to the SAP.

Appendix A
Greenhouse Gas Inventory and Projections

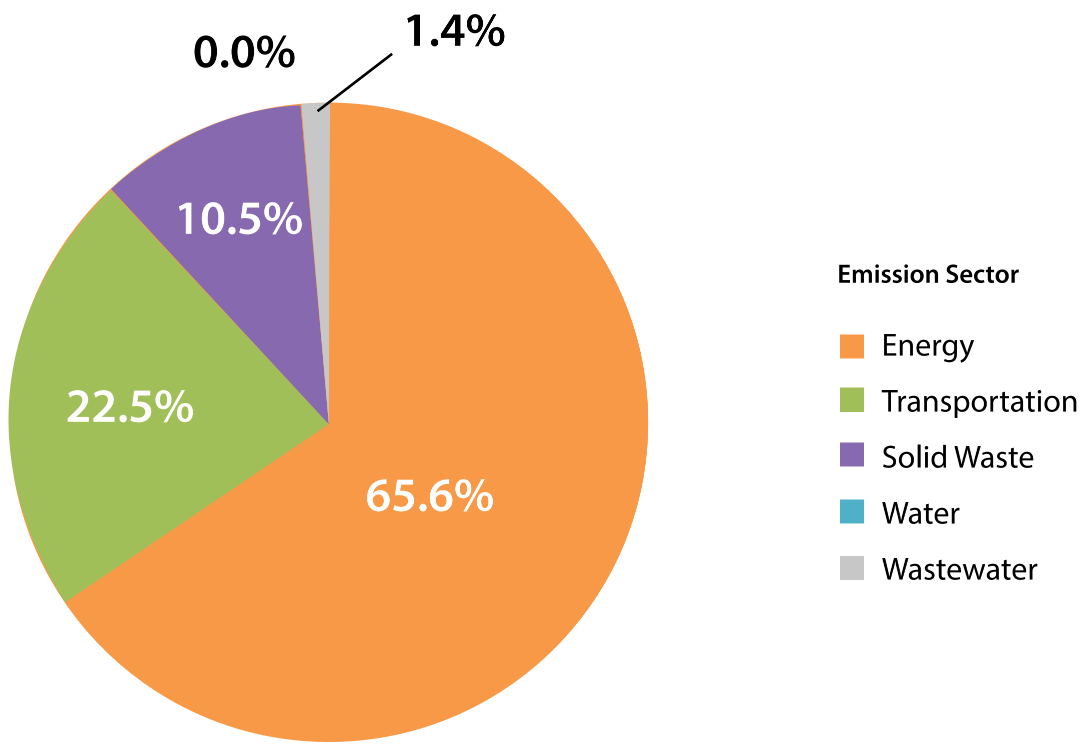
Volusia County Municipal Greenhouse Gas Inventory Summary

In order to understand the current operating conditions of Volusia County (the County), a greenhouse gas (GHG) emissions inventory was developed for municipal operations in year 2007 (see **Table A-1** and **Figure A-1**). The GHG inventory evaluates a range of County operations such as energy consumption (i.e., electricity and natural), transportation (i.e., fleet and off-road vehicles), solid waste, potable water consumption, and wastewater generation. The following section discusses how the GHG inventory was developed with respect to data sources, quantification methodologies, and assumptions. The section also discusses future steps that could be taken to streamline future GHG inventory efforts. It should be noted that this GHG inventory represents baseline emissions. Inventories should be updated every three to five years to track and monitor progress of reduction strategies and measures.

Table A-1 - Municipal Greenhouse Gas Inventory and Projections

Municipal Greenhouse Gas Inventory and Projections							
		2007 Activity Levels		2007 Emissions (BAU)		2025 Emissions (BAU)	
Emissions Sector	Subsector	Activity	Units	MT CO_2e/yr	%	MT CO_2e/yr	%
Energy				73,896	65.6%	81,506	65.6%
	Electricity	128,180	MWh	71,256	63.2%	78,594	63.3%
	Natural Gas	496,170	therms	2,640	2.3%	2,912	2.3%
Transportation				25,402	22.5%	28,017	22.5%
	Vehicle - Gas	1,048,097	gallons	9,400	8.3%	10,368	8.3%
	Vehicle - Diesel	418,219	gallons	4,260	3.8%	4,698	3.8%
	Equipment Fleet	293,669	gallons	3,004	2.7%	3,313	2.7%
	Votran	853,683	gallons	8,725	7.7%	9,624	7.7%
	Airport	1 ,330	gallons	12.81	0.0%	14.13	0.0%
Solid Waste				11,807	10.5%	13,023	10.5%
	Disposal	536,949	tons	2,016	1.8%	2,224	1.8%
	Alt Daily Cover	61,447	tons	193	0.2%	213	0.2%
	Fugitive CH_4	1,519	scf	9,598	8.5%	10,586	8.5%
Water		565	MG	1.21	0.0%	1.33	0.0%
Wastewater				1,539	1.4%	1,697	1.4%
	Influent (CH_4)	581	MG	1,502	1.3%	1,656	1.3%
	Effluent (N_2O)	581	MG	36.64	0.0%	40.41	0.0%
Total				112,664	100.0%	124,244	100.0%

Figure A-1 - Municipal 2007 Greenhouse Gas Emissions by Sector



Emission Sectors

Energy

The County's Energy Sector consists of the electricity and natural gas consumption for the operation of County buildings and facilities. Due to the warm climate of Volusia County, electricity is a much larger source of GHG emissions than natural gas. Nevertheless, both energy sources represent a sector that can be affected by the Sustainability Action Plan (SAP).

Data Sources:

For electricity, the County obtained historical (2007) consumption data from local utility providers. The County's electricity is provided by three separate utility companies: Florida Power and Light, Progress Energy, and Clay Electric Cooperative. All three utilities were able to provide annual electricity consumption (i.e., kilowatt-hours per year) in the year 2007 for County accounts.

For natural gas, the County also obtained historical (2007) consumption data from local utility providers. The County's natural gas is provided by three separate utility companies: TECO Partners, Florida Power and Light, and Florida Public Utilities. All three utilities were able to provide annual natural gas consumption (i.e., therms per year) in the year 2007 for County accounts.

Quantification Methodology:

The GHG emissions associated with electricity and natural gas consumption were quantified using emissions factors and methodologies prescribed by the US Environmental Protection Agency (EPA) and US Energy Information Administration (EIA). Both agencies represent credible sources for the GHG inventory.

Electricity is considered an indirect source because although consumption may occur within the County, it is likely that the electricity generation and subsequent GHG emissions occurs in another region. For electricity, the County first inquired with the utility providers for an electricity intensity emission factor.

An electricity intensity emission factor represents the amount of GHG emissions emitted per unit of electricity generated. Therefore, a utility provider that uses more renewable resources for electricity generation would have a lower electricity intensity than one that used primarily coal and other fossil fuels. In the absence of electricity intensity factors for all three utilities, the County used the EPA's Emissions and Generation Resource Integrated Database (eGRID) emission factor for the FRCC region, which represents the State of Florida. EPA has developed and maintains a database (eGRID) for electricity intensities throughout the US.

Natural gas is considered a direct source because the consumption and associated emissions occur in the same location. Emission factors for natural gas are more standard than those for electricity because of the similar composition of natural gas throughout the US. Natural gas emission factors were obtained from EIA's Voluntary Reporting of Greenhouse Gases Program.

Assumptions and Uncertainties:

The County was able to obtain electricity and natural gas consumption data directly from the utility providers, which is the most accurate source of consumption data. The natural gas emission factors are also accurate emission factors to use for the inventory. For electricity, although the FRCC region eGRID emission factor was used, which represents the State of Florida, a more utility-specific emission factor for Florida Power and Light, Progress Energy, and Clay Electric Cooperative could be developed. This would provide a more accurate electricity intensity factor, which would change the emissions depending on how different the renewable portfolios of the three utilities are from the State of Florida average.

Future Actions:

In order to streamline the GHG inventory and tracking/monitoring process for future updates, the County should continue an open conversation with the main point of contact for all six utility providers. This would ensure that the proper contact for data requests is always known and that all new information regarding these requests (e.g., electricity intensity studies) is known immediately. In addition, the County could begin to track its own consumption rates (e.g., kilowatt-hours, therms) by recording consumption amounts from utility bills.

Transportation

The Transportation sector includes the County-operated vehicle and equipment fleet. The sector includes GHG emissions associated with the operation of the Volusia County fleet, Votran, and ground operations at the Daytona Beach International Airport. This sector is the second largest emission sector for the municipal operations.

Data Sources:

The vehicle miles traveled (VMT) and fuel consumption data for vehicle and equipment operations were obtained from the Volusia County Fleet Department, Votran, and staff at the Daytona Beach International Airport. These represent the most accurate sources of transportation data for County operations.

Quantification Methodology:

The GHG emissions associated with County vehicles, equipment, airport support equipment, and buses were quantified using emission factors from EIA's Voluntary Reporting of Greenhouse Gas Program. EIA provides gasoline- and diesel-fueled emission factors for various vehicle sizes including passenger vehicles, light-duty trucks, and heavy-duty trucks. For equipment, EIA provides emission factors for typical diesel-fueled equipment as well as low-sulfur diesel equipment. Although EIA emission factors represent a more national-scale emission factor, the State of Florida does not require more stringent vehicle emission standards like other states such as California. Therefore, the EIA emission factors are appropriate to use for the County's GHG inventory.

Assumptions and Uncertainties:

The transportation data received are from the actual County departments or entities that operate the vehicles and equipment. Therefore, this data represents the most accurate data for transportation operations.

Future Actions:

All three transportation entities were able to provide VMT and fuel usage data fairly readily when requested. It is important to maintain this level of data management for all three entities. The County could consult with the entities to inquire on methods to streamline or automate the process (e.g., automatic vehicle mileage and fueling logs at pump stations).

Solid Waste

The County operates the Tomoka Landfill, which provides waste management services for County operations as well as a number of cities and unincorporated Volusia County areas. Therefore, only a portion of the Tomoka Landfill GHG emissions would be the responsibility of the County. Solid waste GHG emissions are generated from decomposing waste in place and methane management activities.

Data Sources:

Total solid waste disposed at Tomoka Landfill was provided by the County's Solid Waste Department. In addition, the County's Solid Waste Department provided solid waste characterization, which affects the GHG emission generation rate. Lastly, the County also provided data for the landfill's methane capture system, which includes methane flared and fugitive methane emissions.

As discussed above, only a portion of the solid waste disposed at the Tomoka Landfill is attributable to County operations. The Tomoka Landfill operates several transfer stations that accept waste from multiple jurisdictions; therefore, the current waste management system is not structured to accurately determine the quantity and origin of solid waste. As an alternative method to determining the County's solid waste disposal, the total County-operated building square footage was used along with a commercial solid waste generation factor (i.e., tons of solid waste per square foot) to estimate total tons of solid waste disposed by the municipal operations. It was assumed that the County's solid waste has approximately the same waste categorization percentages as that for the landfill.

Quantification Methodology:

The solid waste disposal GHG emissions were quantified using the ICLEI Clean Air and Climate Protection (CACP) Software. CACP allows the user to input total tons of solid waste disposed, waste categorization, and waste management type. It should be noted that the CACP program quantifies lifecycle emissions associated with solid waste disposal. Therefore, solid waste emissions presented in the inventory represent the total GHG emissions that occur over the lifetime of decomposition. Finally, the GHG emissions associated with the landfill's methane management were quantified using emission factors from EPA's AP-42 Compilation of Air Pollutant Emission Factors.

Assumptions and Uncertainties:

The solid waste disposal and methane management GHG emissions associated with County operations were estimated using commercial waste generation rates. Therefore, although the waste generation rates are used with empirical County building square footage, there is a degree of separation from the actual data required for quantification (i.e., tons of solid waste disposed by County). In addition, the GHG inventory assumes that the waste categorization of the County's waste is similar to the total waste accepted by the Tomoka Landfill. Using the same waste categorization assumption, the percentage of the County's solid waste out of the total solid waste was applied to the total methane management GHG emissions to determine the County's portion.

Future Actions:

In order to develop a more accurate GHG inventory for municipal operations, the unincorporated Volusia County, and all surrounding entities, it is necessary to track the amount and origin of solid waste being disposed at the Tomoka Landfill. This information would allow future planning efforts to assign solid waste reduction targets to entities while accounting for their relative contribution to the landfill.

Potable Water

In order to provide potable water for municipal operations throughout the County, electricity must be used to treat, convey, and distribute water. The GHG emissions associated with electricity consumption for providing potable water service is typically a relative small portion of total emissions. However, potable water is a precious resource that will require improvements in conservation and efficiency as it becomes scarcer in the future.

Data Sources:

The County contacted all of the various municipalities that provide potable water to County buildings and facilities. Water consumption was provided in units of thousand gallons per year.

Quantification Methodology:

National water conveyance intensities were used to estimate the amount of energy required to provide each gallon of potable water. These intensity factors, in units of megawatt-hours per million gallons, are based on studies from various locations around the country.

Assumptions and Uncertainties:

The water intensity factors used in the inventory are not specific to Volusia County or the State of Florida. Although the GHG emissions associated with potable water is typically less than 5% of a municipality or community's total GHG emissions, it is important to accurately identify GHG emissions for all sources.

Future Actions:

In order to more accurately understand the potable water energy intensity of Volusia County, it is necessary to continue to work with the State of Florida to identify new studies and research that investigate energy consumption in the potable water sector.

Wastewater

Data Sources:

The wastewater data associated with Volusia County operations were provided by the County's Utility Department. The Utility Department provided annual gallons processed by municipal wastewater treatment plants, biological oxygen demand of influent, and nitrogen content of effluent.

Quantification Methodology:

Process emissions associated with wastewater treatment plants were quantified using methodologies from the International Panel on Climate Change (IPCC) 2006 Guidelines for National Greenhouse Gas Inventories. This method represents the most widely accepted quantification for wastewater treatment process emissions. It should be noted that electricity consumption associated with wastewater treatment facilities are included within the energy intensity of potable water.

Assumptions and Uncertainties:

The data sources and quantification methodology used for the wastewater sector are the best available sources. The quantification of methane emissions for wastewater treatment was performed using a standard methane correction factor (MCF) for treated systems. Although there is a range of possible MCFs, using the standard MCF for treated systems provides a credible and accurate quantification of methane emissions.

Future Actions:

During the inventory data gathering process, the Utility Department was informed that similar data would be requested in the future to track the efficacy of the SAP. It was confirmed by the Utility Department that the data needed for the wastewater sector would continue to be readily available.

Volusia County Municipal Greenhouse Gas Projections

In order to estimate the effectiveness of future reduction measures and strategies, it is necessary to project the County's baseline emissions to a future planning year. For this SAP, baseline municipal emissions were projected to year 2025, which coincides with the planning horizon year for the County's Comprehensive Plan as well as Executive Order 07-127. By aligning the timelines of all three initiatives, the SAP can achieve synergies from the collective goals and objectives. In addition, future updates and new information can be now be synchronized.

Projecting the growth of a government entity is not a precise science. There are numerous factors that contribute to the growth of government services. However, possibly the most relevant factor is population growth. Therefore, for the purposes of projecting Volusia County's municipal GHG emissions, the projected annual average population growth rate from the 2010 Census from 2010 to 2025 (0.84%) was used to project baseline (2007) emissions to 2025 (see **Table A-2**). It is unlikely that government operations would increase at a one-to-one ratio with population growth; therefore, a factor of 65% was applied to the annual population growth rate to estimate the average annual growth of the County's operations. It should be noted that 65% is not an official growth value provided by the County; rather it represents the average growth rate factor accepted by various other local governments throughout the US. The results of the projected municipal GHG emissions are shown in **Table A-1**.

Table A-2 - Emissions Projection Indicators

Emissions Projection Indicators			
	Population	Jobs	Service Population
2007 Indicators			
Volusia County	508,014	166,260	674,274
State of Florida	18,680,367	9,153,380	27,833,747
2025 Indicators			
Volusia County	556,900	204,832	761,732
State of Florida	22,573,600	11,061,064	33,634,664
Population Growth (2010-2025)			12.60%
Annual Average Growth Rate			0.84%
Percent of Municipal Growth			65.00%
Annual Municipal Growth			0.55%

Source:

State of Florida BEBR Historical Population 1980-2007

State of Florida BEBR Projections of Florida Population by County, 2009-2035 (March 2010)

2007 Total Population: Florida Estimates of Population 2007, BEBR, University of Florida

2007 Total Employment: Bureau of Labor Statistics, Quarterly Census of Employment and Wages

2025 Total Population: BEBR, Projections of Florida Population by County, 2010-2040, June 2010

2025 Total Employment: Linear extrapolation from the State of Florida Agency for Workforce Innovation year 2018 employment projection

Community-Wide Greenhouse Gas Inventory

Although this SAP is primarily focused on municipal operations, municipal operations typically only represent approximately 3-5% of a county's or city's total GHG emissions. Therefore, in order to provide perspective on the community-wide (i.e., unincorporated areas within Volusia County, incorporated cities within Volusia County, and municipal operations) emissions activity, a top-down GHG inventory using Florida's state-wide inventory was developed and analyzed as part of the plan. This section will describe the methods used to develop a top-down community-wide GHG inventory and the limitations of a top-down inventory.

Methodology (Inventory and Projections):

In 2008, the Center for Climate Strategies prepared a state-wide Florida GHG inventory report. The report includes historical (e.g., year 1990), current, and forecasted emissions (e.g., 2025). At the time of this writing, a bottom-up community-wide GHG inventory has not been developed for Volusia County. A bottom-up GHG inventory for a community requires extensive labor in terms of data tracking and quality assurance for available data. Therefore, current bottom-up efforts have been focused on a municipal GHG inventory where information is readily available. However, to provide context of the community-wide emissions, a top-down inventory has been prepared using the Florida state-wide GHG inventory.

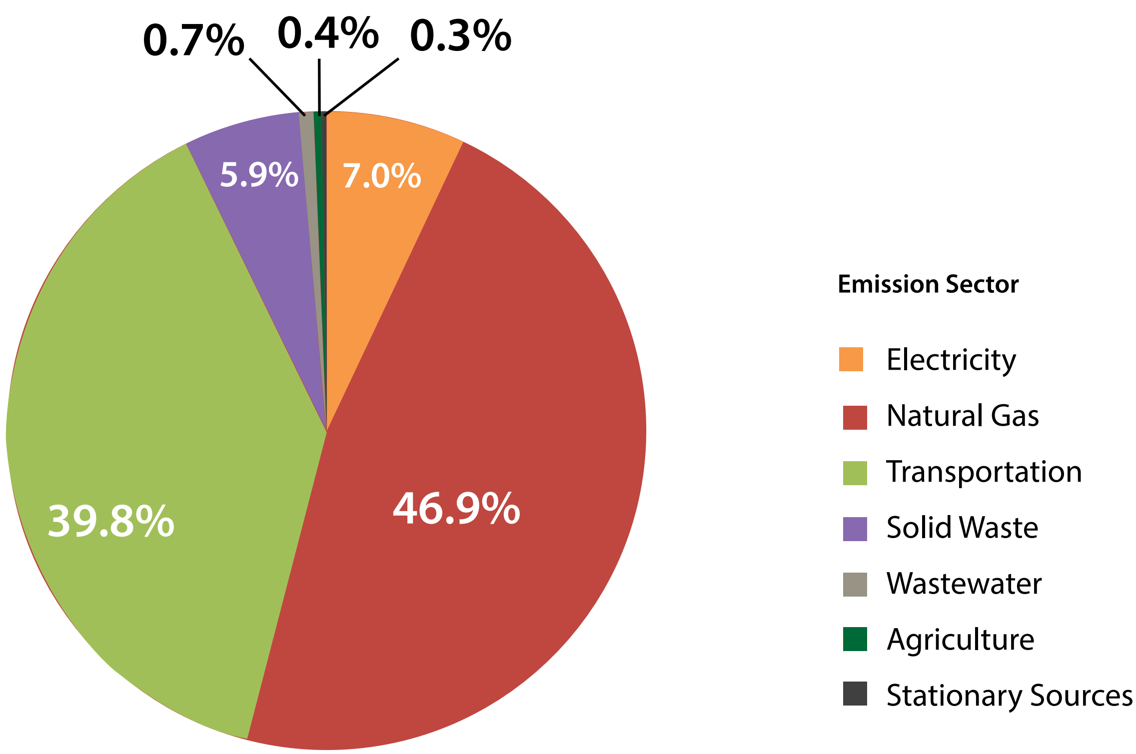
The Florida state-wide inventory was scaled down to the Volusia County community-wide level using service population. Service population is the sum of population and employment for a region. The service population figures for 2007 and 2025 were obtained from the University of Florida's Bureau of Economic and Business Research, Bureau of Labor Statistics, and Florida's Agency for Workforce Innovation, all of which represent accurate and applicable data sources for population and employment data (see **Table A-2**). The portion of the state-wide inventory attributed to Volusia County was calculated by taking the service population of the entire county with respect to the State of Florida's total service population. The results of this top-down approach are shown in **Table A-3** and **Figure A-2**.

It is acknowledged that a top-down inventory has drawbacks with respect to precision and future monitoring efforts. Because the emissions are not linked to empirical activity data, there could be difficulty drawing a link between GHG reduction strategies and efforts, and monitored GHG reductions. However, it is important to provide a context of GHG emissions at the community-wide level to begin the planning and mitigation process. The next step for Volusia County is to develop a bottom-up GHG inventory to compliment this initial top-down effort.

Table A-3 - Community-wide Greenhouse Gas Inventory and Projections

Community-wide Greenhouse Gas Inventory and Projections					
		2007 Emissions (BAU)		2025 Emissions (BAU)	
Emissions Sector	Subsector	MT CO_2e/yr	%	MT CO_2e/yr	%
Energy – Fuel Combustion		447,437	7.0%	505,472	7.0%
	Residential	42,636	0.7%	48,166	0.7%
	Commercial	104,894	1.7%	118,500	1.7%
	Industrial	299,906	4.7%	338,806	4.7%
Energy – Electricity Generation		2,982,104	46.9%	3,368,904	46.9%
Transportation		2,465,141	38.8%	2,784,887	38.8%
	On-Road	2,201,573	34.6%	2,487,132	34.7%
	Boats	72,675	1.1%	82,102	1.1%
	Locomotives	16,715	0.3%	18,883	0.3%
	Misc	174,178	2.7%	196,770	2.7%
Solid Waste		377,087	5.9%	425,998	5.9%
Wastewater		42,878	0.7%	48,440	0.7%
Agriculture		25,025	0.4%	25,025	0.3%
	Soil Management	5,110	0.1%	5,110	0.1%
	Live Stock	19,915	0.3%	19,915	0.3%
Stationary Sources		16,231	0.3%	18,336	0.3%
Total		6,355,903	100.0%	7,177,062	100.0%

Figure A-2 - Community-wide 2007 Greenhouse Gas Emissions by Sector



Statewide Reductions

Although local governments have the greatest ability to influence the activities and subsequent emissions that occur within their jurisdiction, state and federal actions play a critical role in the movement toward a more sustainable and efficient future. These high-level actions have the ability to affect a large range of activities and GHG emissions. Florida's Executive Order 07-127 has established GHG reduction goals along with actionable measures to help achieve the targets. Executive Order 07- 127 states that by 2025, state-wide GHG emissions should be reduced to 1990 levels, and by 2050, state-wide GHG emissions should be 80% less than 1990 levels. In order to accomplish these goals, the Executive Order 07-127 states that a vehicle emissions standard comparable to the California motor vehicle emissions standard (i.e., Pavley I and II) should be adopted (adopted in 2009). In addition, utilities should produce at least 20% of their electricity from renewable sources (i.e., 20% renewable portfolio standard [RPS]). These two measures that would affect the transportation and energy sectors of all jurisdictions throughout the state, which are typically the largest GHG emission sectors of any inventory, were quantified and applied to the municipal and community-wide GHG inventories (see **Table A-4**).

For the motor vehicle emissions standard, the percent reduction of GHG emissions from implementation of California's Pavley I and II (approximately 19%) was obtained from the Assembly Bill 32 Scoping Plan. This same percent reduction was applied to the on-road emissions from the Volusia County inventories to estimate the reductions associated with implementation of the standard. For the RPS goal, the current state-wide RPS standard was obtained from the EIA (2.1%). Therefore, the change in RPS would be approximately 18%. This percent reduction was applied only to the electricity portion of the Volusia County inventories to estimate the reductions associated with implementation of the RPS.

The Executive Order also includes other actions such as netmetering (i.e., allowing renewable energy producers to turn electric meters backwards), reducing costs of connecting renewable energy technologies to Florida's power grid, revising the Florida Energy Code for Building Construction to increase energy performance in new construction in Florida by 15% from 2007 Energy Code, and establishing maximum allowable GHG emissions for electric utilities in Florida. Although all of these actions would further reduce Volusia County's and the State of Florida's GHG emissions, these measures are highly variable in terms of how much they would affect Volusia County (e.g., number of renewable producers within Volusia County, energy performance for natural gas or electricity). Therefore, the inventories presented do not include the quantification of these measures. It should be noted that once these measures become more focused, quantification and emission reduction credits can be applied to Volusia County.

Table A-4 - Statewide Reductions

Statewide Reductions		
Statewide Reduction Measure (per Executive Order 07-127)		**Units**
Vehicle Emissions Standard[1]		
Total On-Road Transportation Emissions (CA)[2]	168.1	MT CO_2e/yr
Projected Reduction (CA)[2]	31.7	MT CO_2e/yr
Percent Reduction of On-Road[2]	19%	Percent
Total 2025 Reduction[3]	**1,955**	**MT CO_2e/yr**
Renewable Portfolio Standard		
Current Florida Renewable Portfolio	2.10%	Percent
Target Renewable Portfolio	20.0%	Percent
Change in Renewable	17.9%	Percent
Total 2025 Reduction	**14,068**	**MT CO_2e/yr**
Total Foreseeable Statewide Reduction	**16,023**	**MT CO_2e/yr**

Notes:

[1] Modeled after California's Pavley I and II vehicle emissions standard legislation

[2] Values from California's Assembly Bill 32 Scoping Plan

[3] Reduction percentage from California legislation applied to Volusia County's transportation sector

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